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CONTENTS

GENERAL ABBREVIATIONS

Used in Valve Data Tables

* appended to the " Heater Volts " column indicates a directly-heated cathode (that is, filament). Valves without the asterisk have indirectly-heated cathodes.

† appended to the " Heater Amps " column indicates that the valve has a centre-tapped filament or heater. The figures given are invariably for the parallel connection of the two parts ; for the series connection the voltage is doubled and the current halved.

(Some directly-heated valves of low current consumption may need the connection of a resistor across one half of the filament when using the series connection.)

Valve Abbreviations

a—a	Anode-to-anode
BT	Beam tetrode
c_{ak}	Anode-cathode capacitance
c_{ga}	Grid-anode capacitance
c_{gk}	Grid-cathode capacitance
CT	Centre tap
D	Distortion
DD	Double-diode
DBT	Double-beam tetrode
DP	Double pentode
DT	Double triode
F.W.	Full-wave
g—g	Grid-to-grid
g_c	Conversion conductance
g_m	Mutual conductance
H.W.	Half-wave
H	Heptode
H_x	Hexode
I_K	Cathode current
MV	Mercury vapour
O	Octode
P	Pentode
P_a	Anode dissipation
PIV	Peak inverse volts
R	Rectifier
r_a	Anode a.c. resistance
R_K	Cathode bias resistance
R_L	Optimum load resistance
SD	Single diode
SE	Secondary emission
SQ	Special Quality
T	Triode
TD	Triple diode
TH	Triode heptode
TH_x	Triode hexode
TP	Triode pentode
TT	Tetrode
VD	Voltage-doubler
VM	Variable mu

Transistor Abbreviations

P_c	Collector dissipation at 25°C
V_c	Collector volts
I_c	Collector current
I_e	Emitter current
$r_b=r_b'$	Base resistance
$r_e=r_e'$	Emitter resistance
r_c	Collector resistance
r_c'	Collector resistance (common-emitter connection)
r_m	Mutual resistance
α'	Current gain (common-emitter connection)
α	Current gain
$f_c\alpha$	Alpha cut-off frequency
I_{co}	Collector current at $I_e=0$
$r_c=r_c'(1+\alpha')$	

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EXPLANATION OF THE TABLES

THE INFORMATION GIVEN refers to the main electrical characteristics of valves together with their base connections. Physical dimensions are not included since there is a limit to the amount of information which it is practicable to give, and size is only occasionally an important factor in the choice of a valve.

The valves are classified under main headings according to their type. In each section they are divided according to their make and then sub-divided into obsolete, replacement and current types. The tables are largely self-explanatory, but the following notes should be read carefully if the tables are to be fully understood.

Limitations of space necessarily restrict the amount of information which can be included in these tables, so designers requiring more detailed information should consult the valve manufacturers' published literature. Also to economise on space a valve listed by a particular manufacturer as " obsolete " may not appear under that manufacturer's name, but will appear under another manufacturer's heading.

FREQUENCY-CHANGERS

Valves in this section are intended primarily for use as frequency-changers in superheterodynes and the figures given are the normal operating conditions for this application. Some of the valves included are occasionally used for other purposes, however, and the voltages and currents may then be very different. Even in their normal application differences may be found in individual receivers, since not all designers adopt the " normal " conditions; this is particularly so on short-wave bands.

It is to be noted that some valves which do not include an oscillator section, and which thus apparently require a separate oscillator, can actually be used as complete frequency-changers by using an oscillator circuit coupled between cathode and another electrode.

SCREENED TETRODES AND PENTODES

The main application of valves in this section is to r.f. and i.f. amplification and the operating conditions are normal ratings for this condition. No distinction is made between tetrodes and pentodes because in most cases the type of valve is immaterial as long as its characteristics are otherwise suitable. It is only important in special applications, where separate use is made of the suppressor grid, and then the normal characteristics are in any case insufficient to enable a choice of valve to be made. Except where the suppressor grid (g_3) is internally connected, it is possible to determine whether a valve is a tetrode or a pentode by reference to the valve-base connections.

Some of the valves in this section are also listed under Amplifier Triodes. The characteristics given there are obtained with the screen-grid connected to the anode.

Many of the valves are suitable for use in R-C-coupled a.f. amplifier stages. When so used the voltages applied to the electrodes and the currents obtained are very different from the r.f. amplifier condition. They cannot readily be given, however, since they are as much a property of the circuit values as of the valve.

OUTPUT VALVES 1

Triodes, beam tetrodes and pentodes are all included here with normal maximum operating conditions as output valves for single-valve Class-A operation for a.f. application. They are distinguished by the letters (T), (BT) and (P) following the type number and those containing other systems have additional letters (SD), (DD) and (T) for single or double diode and triode, respectively.

A few contain the elements of an h.t. rectifier in addition and these are distinguished by the letter (R).

In some cases the conditions for a tetrode or pentode operating as a triode with the screen-grid joined to the anode are also given. This condition can be distinguished by the absence of a figure for screen voltage, but in addition the letter (T) placed after the type number indicates that the conditions are those of a triode. The fact that the electrode structure is that of a tetrode or a pentode is obvious as the valve appears in another row followed by letters (BT) or (P).

Even under Class-A conditions the anode and screen currents rise with the signal input to a small extent. The anode current with full drive is about 2 per cent. greater than the quiescent value. With some valves the screen current increases much more and may become as high as three or four times the quiescent value. This increase is usually greatest when the valve is of a type drawing a very low quiescent current.

Since there is no standard method of rating valves, the figures quoted in the tables are sometimes for the no-signal condition and sometimes for full drive. It is believed that most of the figures for British valves are for no-signal, whereas most of those for American types are for maximum applied signal.

The matter is mentioned chiefly to explain small differences which may exist between the figures given here and those which may be found in other lists. The differences are, in practice, unimportant for they are less than the normal variations between individual specimens of the same type.

Because of the rising current with drive there is a slight difference in the output powers obtainable with fixed grid bias on the one hand and cathode bias by a resistor on the other. Figures for battery-type valves are invariably for the fixed-bias condition. For other valves there may be some discrepancies since again there seems to be no standard procedure for indicating output. The difference is not large, however, and can be ignored for most purposes. In general, the output with cathode bias is up to 10 per cent less than with fixed bias.

The maximum resistance which may safely be included in the grid-to-cathode external circuit depends on the method of obtaining grid bias. With valves taking more than about 20 mA cathode current it is a safe rule to limit the grid resistor to 0.5 MΩ for cathode bias and 0.1 MΩ for fixed bias.

In individual cases and under particular operating conditions it may be safe to exceed these figures, but this should not be done without close investigation.

OUTPUT VALVES 2

The conditions included here are those for push-pull operation of a.f. output stages. Five modes of push-pull are recognized and distinguished in the " Class " column ; they are A, AB_1, AB_2, B_1 and B_2. In Class A both valves are conductive over the whole input cycle and the anode current with full drive is substantially the

same as that with no drive. In Class AB the valves are worked individually under non-linear conditions and may be individually cut-off over a small part of the input cycle ; the anode current for full output is appreciably higher than that with no input. In Class B each valve is cut off for about one-half of the input cycle and the anode current at full output is much greater than that with no input signal. The subscripts 1 and 2 show that operation is respectively without and with grid current. The anode and screen currents quoted for Class-A and -AB operation are with the maximum input signal voltage ; the currents for Class-AB_2, -B_1 and -B_2 operation, however, are subject to considerable variation with input, so it is more useful here to give figures for the quiescent conditions. With Class-AB and -B operation the manufacturer's literature should, in any case, be consulted.

For Classes AB_2 and B_2, the minimum grid-to-grid input resistance is given. The figure, together with that of the input voltage, is necessary for the design of the driver stage.

The valves included in this section fall into two groups. One consists of double triodes and double pentodes intended mainly for Class-B_1 and Class-B_2 operation. They are chiefly battery types which used to be designated as q.p.p. and Class-B stages. There are also a few indirectly-heated-cathode types (for example 6A6) which have other applications ; these last will also be found in the appropriate section (usually Amplifier Triodes) with the figures appropriate to one section of the valve as an amplifier.

Figures for anode and screen currents are quoted *per valve* (or per unit in the case of double valves) and in some cases several sets of different figures are given for the same valve under different conditions. Apart from double valves, most of the valves in the section appear also in Output Valves 1, and to distinguish between pairs of valves and double valves, which may not be listed elsewhere, the heater-current figures are given only for double valves (unless otherwise stated). The figures for the others are obtainable from Output Valves 1.

Very few Class-A conditions are given because they are usually obtainable directly from Output Valves 1. For push-pull Class A the currents and anode-to-anode load are normally twice the figures for single-valve operation. The power output for the same odd-order distortion is usually a little more than double.

The differences between fixed-bias and cathode-bias are considerable under Class-AB and Class-B conditions. Where no value is quoted for a bias resistor it is to be understood that operation with a fixed bias is required ; where a bias-resistor value is given, the other figures refer to cathode-bias operation. With fixed bias, it is usually necessary for the bias source to be of low impedance ; with positive drive it is essential.

The value of bias resistor quoted (R_K) is that required per valve, or per unit in the case of double valves.

OUTPUT VALVES 3

The valves in this section are designed to withstand short-duration high-voltage peaks and the figures given are for television line-scan output-stage working.

The amount of information provided in this section is necessarily limited, and operating conditions vary so widely with circuit application that in all cases of doubt the manufacturer's literature should be consulted.

THERMIONIC DIODES

The main characteristics required to be known about a diode are given here. Some of the double types have a common cathode, whereas others have separate cathodes. These can be distinguished by reference to the valve-base connections. Some guidance to the internal resistance of a diode is given by the column giving the maximum rectified current : high-current types are invariably of lower resistance than those for low current.

Multiple valves which include diodes are not listed here but will be found under the section appropriate to the main assembly of the valve ; that is, Screened Tetrodes and Pentodes, Amplifier Triodes and Output Valves 1.

SEMICONDUCTOR DIODES

This section includes copper-oxide, selenium, germanium and silicon diodes with ratings not exceeding 300 PIV and 100mA maximum rectified current, i.e. the devices listed here are intended mainly for signal operation rather than power rectification (although many can be used as low-power rectifiers). Other diodes are listed in the Semiconductor Rectifiers (silicon and germanium) and Metal Rectifiers (copper oxide and selenium) sections, except when the inclusion of a particular device there would obviously be wrong—the G.E.C. Type SCV1, for instance, is designed for use as a voltage-dependent capacitor. Maximum ratings are given and in one column typical applications are listed.

JUNCTION TRANSISTORS

Unless otherwise stated, parameters are given for a temperature of 25°C. Comparisons between various types should be made only at the same temperature : in cases of doubt fuller data should be consulted but, in general, the major effects of elevated temperature are to reduce the permissible dissipation and increase the collector leakage current I_{co}. (This approximately doubles for each rise of 10°C and can affect bias conditions with unsuitable circuit arrangements.) Other characteristic changes which take place with temperature are of a relatively minor magnitude and in many cases may be ignored.

The figure for $V_{c\ max.}$ should never be exceeded in normal use. In many circuits the maximum allowable h.t. rail voltage will be half this figure.

The small-signal parameters chosen for tabulation are the conventional equivalent-T network ones for the common-emitter configuration. This is by far the most common circuit arrangement in use with junction transistors. Corresponding figures for common-base and common-collector arrangements are easily derived.

The collector voltage and current at which the small signal parameters are given is defined. This is important since some of the parameters vary considerably with the bias point. In particular there is a large increase in r_e with decreasing I_e.

The figure for alpha cut-off is for the common base configuration and is lower by a factor of approximately α' for the common-emitter arrangement. No attempt

is made to specify large signal-behaviour. In general the most important departures from the figures quoted for small-signal conditions are likely to be decreased r_e and decreased α'. The table on Page 2 explains the symbols used.

AMPLIFIER TRIODES

The conditions given are those pertaining to operation as transformer-coupled a.f. amplifiers at maximum rating, which is the most suitable condition for comparing valve characteristics. Conditions for R-C coupling depend too much upon the circuit constants to be useful. At the reduced voltages normally applied to the electrodes with R-C coupling, the a.c. resistance and mutual conductance are usually 20 to 50 per cent. higher and lower respectively than the figures listed.

SMALL TRANSMITTING VALVES

All categories are included in this section (triodes pentodes, beam tetrodes, etc.) having up to 50 watts anode dissipation. The figures given are for Class-C r.f. amplification on telegraphy. It should be noted that in the case of double valves (identified by letters (DT), (DBT), etc., in the "Type" column) the figures for anode, screen and grid currents, dissipation and output refer to the pair.

Regarding the operating frequency column, the figures under "Reduced Rating" can generally be taken to be the maximum frequencies at which the valves will give a useful power output. As the efficiency of a valve decreases at these higher frequencies, it is necessary to make some reduction to the ratings (or power input) in order to ensure that the power dissipated in the valve does not exceed the safe limit. The percentage reduction varies from valve to valve, however, so it is advisable to consult the manufacturer's literature if the reduced ratings are required.

VALVE RECTIFIERS

Included in this section are types which have simultaneous ratings up to 10kV peak inverse and 500mA maximum rectified current. Valves designed for the production of e.h.t. supplies (i.e., over 1kV at less than 30mA or so) will be found in the E.h.t. Rectifier section.

The ratings given are maximum ones and assume a supply frequency of 50 c/s. In some cases a higher current output is permissible if the input voltage is reduced and in nearly all cases the input voltage can be considerably increased and the output current slightly increased if the rectifier is followed by a choke-input filter instead of the usual reservoir capacitor.

The figure for minimum resistance can be reduced if a smaller reservoir capacitor is used. When an input transformer is used, this resistance is usually provided by the resistance and leakage reactance of its windings, but in transformerless circuits sufficient resistance must be provided to limit the peak current.

Figures for the mean unsmoothed-output voltage are not given, since they depend on the current and reservoir capacitance as well as the valve. With no current drain the voltage reaches 1.414 times the r.m.s. input voltage and this figure should be taken for the voltage rating of the reservoir capacitor. At maximum current the output voltage is approximately equal to the r.m.s. input voltage in the case of rectifiers of 60 mA and upwards current rating.

METAL RECTIFIERS

Copper oxide and selenium rectifiers are both made in basic units of low voltage rating and in various sizes for different currents. Different voltages are catered for by stacking together various numbers of the basic units and there are also different stacking methods for units for use as half-wave, full-wave, voltage-doubler and bridge rectifiers. The total number of rectifier assemblies possible with only a few basic units is thus very large. In order to reduce the numbers, therefore, a few examples are listed as guides and from these the other possible ratings can be deduced.

SEMICONDUCTOR RECTIFIERS

The devices listed here have ratings which exceed 300 PIV and 100mA maximum rectified current and they are thus more suited to power rectification. However, this is not their only use—many are suitable for use in magnetic amplifier circuits etc. Some details of rectifier stacks are included.

E.H.T. RECTIFIERS

Used mainly for the production of the high-tension supplies for cathode-ray tubes, thermionic diodes and metal rectifiers listed here are capable of producing supplies of over 1kV at currents of less than 30mA. Rectifiers capable of producing high-voltage high-current supplies (i.e. for transmitter h.t.) are listed in the Valve Rectifiers section. Three methods of e.h.t.-supply production are recognised in the data. First, the "rectification" of the high-voltage pulse appearing at line-flyback time in a television receiver ; here the ratings assume a pulse duration of about 10μsec. Secondly, the rectification of the output of an r.f. oscillator (100 kc/s and upwards) and, thirdly, by rectification of a low-frequency supply (possibly derived from the mains via a step-up transformer). Characteristics for this last case are marked by relatively large values for the reservoir capacitor.

TELEVISION CATHODE-RAY TUBES

All the tubes in this section are designed for magnetic deflection. It should be noted that the figure given for deflection angle is the number of degrees subtended by the picture diagonal. Although the diagonal of the screen is given as a round number of inches, this should not be taken literally as there are slight variations between tubes.

OSCILLOSCOPE CATHODE-RAY TUBES

Data given under this heading in previous issues of the book have covered a very wide range of c.r.ts, including radar, instrument, and e.s.-deflection television tubes. Due to this diversity, inadequacies in the presentation occurred. Thus, in this edition, the data given previously have been replaced by a directory of manufacturers of "special" cathode-ray tubes.

EFFICIENCY DIODES

The purpose of these diodes, applied to television line-scan circuits, is to provide a section of the line-scan sawtooth waveform from the energy stored in the deflector coils during the flyback, thereby reducing the amount of anode current required in the line-scan output stage. The thermionic diodes here may also be found under Valve Rectifiers, and from the latter section it will be apparent whether they are single or double diodes. Where only one unit of a double diode can be used as a damping diode, this is made clear by a note.

AMERICAN TYPES

Valves listed as "American" require some explanation. The basic type number of many American valves consists of two figure groups separated by a letter group (for example 6L6). Many of these have a following letter group also to distinguish different physical forms of electrically similar valves. These following letter groups do not appear in the tables; only the basic number is listed.

Among the octal-based types the last letters usually have meanings as follows:—

No letter; metal valve; for example, 6L6.
MG; metal-glass; for example, 6L6MG.
G; glass; for example, 6L6G.
GT; glass, tubular; for example, 6L6GT.

The majority of American-type valves in use and available or manufactured in this country are the G and GT types and should be ordered by appending the appropriate letters to the type number as listed in the tables. For replacement purposes it is important to distinguish between the G and GT types, since the former is much larger physically. Electrically all are usually interchangeable but there are small differences of inter-electrode capacitance which may necessitate re-trimming when types are substituted in r.f. and i.f. circuits.

Many newer types are only available in one form and never have following letters.

Many American-type valves are made in this country and are available under the American Type numbers. These are listed under the names of the British firms concerned.

It may be mentioned also that the American 7- and 14-series valves are listed as having 6.3V and 12.6-V heaters respectively as these are common operating conditions. These valves also have maximum ratings of 7V and 14V, and can be used for car radio where the high maximum rating is adopted to suit the voltage of a battery on charge.

"SPECIAL QUALITY" VALVES

These valves are generally improved versions of existing types, designed for operation under more severe conditions than found in ordinary domestic receivers. The description covers several classes of improvement, such as long life, resistance to mechanical shock, electrical stability and various combinations of these. It also includes the improved valves hitherto known as "reliable" valves. No distinction is made in the tables between these various classes, however. The valves are bracketed with their ordinary equivalents and are indicated by the abbreviation "SQ" alongside.

GROUPING

The valves are grouped within their sections as *Obsolete*, *Replacement* and *Current Types* and this has been done in accordance with the recommendations of the manufacturers concerned.

These terms are used in the following senses:—

Obsolete: Valves which are no longer manufactured and which are normally unobtainable. The list is obviously incomplete, since it is impracticable to include all valves back to the first ones ever made! The object has been to include only those types which may still be in use in old sets to assist, by giving their characteristics, in the choice of the most suitable replacement. Isolated specimens may, of course, still be obtainable.

Replacement: Valves which are no longer manufactured in large quantities, but of which so many are in use that small batches are still made for replacement purposes. They are normally still obtainable, but may have to be specially ordered and may be subject to temporary delay. They are valves not normally to be recommended for use in new equipment which is to be manufactured in any large quantity.

Current: These valves include the latest types and older ones which are still being produced in quantity. The latter are usually more readily available but may be expected to become replacement types soon.

It should be realised that all the groups really merge into one another from the user's point of view. Particular obsolete valves may be easily obtainable for a time; individual replacement valves and even some current types may be quite hard to get.

INDEX, BASES AND EQUIVALENTS

On account of the large number of devices included—roughly 4,000 British and 1,000 American types—an index is provided to assist in finding them quickly. All items are listed in alphabetic and numerical order of their type numbers in the index (figures precede letters) and against each entry is the page number (or numbers) where it can be found. Also against each valve are its base connections and a list of its "plug-in" equivalents.

Occasionally a valve may be listed, for example, "10ABC *see* XY99": in these cases, the valves are usually identical and the first number represents an alternative listing. Sometimes a valve listed by a manufacturer as "obsolete" may not be found under that manufacturer's name, provided that it appears elsewhere.

The information which appears under manufacturers' names has been supplied by the individual valve manufacturers and collected into its present form by the staff of *Wireless World*. The data on American types has been collected from many sources, but notably from data lists provided by the Radio Corporation of America.

Blanks in the columns indicate that the figures missing have been found to be unobtainable. Every effort has been made to secure accuracy, and proofs for the "named" sections have been passed by the manufacturers concerned. There are over 50,000 sets of figures in the tables, apart from the base connections, of which there are some 600 distributed among 33 bases. It is hoped that there are no errors; should any be found, *Wireless World* would be pleased to receive details.

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FREQUENCY-CHANGERS

Type			Heater Volts	Heater Amps	Volts: Anode	Volts: Screen	Volts: Grid	Current (mA): Anode	Current (mA): Screen	r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF): c_{gk}	Capacitances (pF): c_{ak}	Capacitances (pF): c_{ga}	Base: Type	Base: Ref.
BRIMAR																	
Obsolete Types																	
1A7	(H)	mix	1.4*	0.05	90	45	0	0.6	0.7	0.6	0.25	7.0	7.0	10.0	0.5	IO	76
		osc			90	—	—	1.2	—	—	—	—	3.4	4.4	0.9		
1LA6	(H)	mix	1.4*	0.05	90	45	0	0.55	0.6	0.75	0.25	7.0	7.7	8.0	0.4	B8B	29
		osc			90	—	—	1.2	—	—	—	—	2.9	3.3	0.6		
15A2	(H)	mix	4.0	0.65	250	100	−3.0	3.5	2.7	0.36	0.55	20.0	7.5	9.5	0.2	B7	2
		osc			170	—	—	4.0	—	—	—	—	—	—	—		
20A1	(TH_2)	mix	4.0	1.2	250	80	−1.5	2.2	3.0	0.7	0.65	12.5	7.0	21.0	0.05	B7	3
		osc			100	—	—	2.3	—	—	—	—	—	—	—		
6A7 } 6A8	(H)	mix	6.3	0.3	250	100	−3.0	3.5	2.7	0.36	0.55	20.0	9.5	12.0	0.26	UX7	1
		osc			170	—	—	4.0	—	—	—	—	6.0	4.6	1.1	IO	1
6F7	(TP)	mix	6.3	0.3	250	100	−3.0	2.8	0.6	2.0	0.3	7.0	3.2	12.5	0.008	UX7	13
		osc			100	—	—	2.4	—	—	—	—	2.5	3.0	2.0		
6K8	(TH_2)	mix	6.3	0.3	250	100	−3.0	2.5	6.0	0.6	0.36	7.5	4.6	4.8	0.08	IO	4
		osc			100	—	—	3.8	—	—	—	—	6.5	3.4	1.8		
12K8	(TH_2)		12.6	0.15	Other data as Type 6K8												
15D1	(H)		13.0	0.2	Other data as Type 15A2												
15D2	(H)		13.0	0.15	Other data as Type 15A2												
20D2	(TH_2)	mix	13.0	0.15	250	100	−3.0	2.5	6.0	0.6	0.36	7.5	4.5	5.0	0.03	B7	3
		osc			100	—	—	3.8	—	—	—	—	—	—	—		
Replacement Types																	
1AC6	(H)		1.4*	0.05	85	60	0	0.7	0.15	0.65	0.325	3.1	7.5	8.5	0.4	B7G	54
DK96/ 1AB6	(H)	mix	1.4*	0.025	85	68	0	0.6	0.14	0.8	0.3	6.0	7.4	8.1	0.36	B7G	54
		osc			—	—	—	—	—	—	—	—	—	—	—		
1R5	(H)		1.4*	0.05	90	45	0	0.8	1.9	0.8	0.25	15.0	7.0	7.0	0.4	B7G	3
7S7	(TH)	mix	6.3	0.3	250	100	−2.0	1.8	3.0	1.25	0.53	20.0	5.0	8.0	0.03	B8B	8
		osc			150	—	—	5.0	—	—	—	—	7.0	3.5	1.0		
12AH8	(TH)	mix	6.3	0.3†	250	100	−3.0	2.6	4.4	1.5	0.55	9.4	5.0	8.0	0.025	B9A	9
		osc			100	—	—	5.7					7.0	2.5	1.2		
20D4	(TH)	mix	6.3	0.3	250	100	−2.0	3.0	3.6	0.9	0.850	12.5	4.5	8.2	0.034	B9A	52
		osc			100			5.0					2.1	0.87			
ECH42	(TH_2)	mix	6.3	0.23	250	85	−2.0	3.0	3.0	1.0	0.75	9.4	4.0	9.2	0.1	B8A	3
		osc			115	—	—	4.8	—	—	—	—	5.5	2.3	1.2		
14S7	(TH)		12.6	0.15	Other data as Type 7S7												
UCH42	(TH_2)	mix	14.0	0.1	200	85	−2.0	3.0	3.0	1.0	0.75	9.4	3.8	9.2	0.1	B8A	3
		osc			100	—	—	3.1	—	—	—	—	5.5	2.3	1.2		
Current Types																	
6BE6 } 5750 (SQ) }	(H)		6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.475	10.0	7.2	8.6	0.3	B7G	29
ECF80	(TP)	mix	6.3	0.43	250	180	−5.8	5.7	1.4	1.5	2.1	5.0	5.2	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.5	1.8	1.5		
ECF82/ 6U8	(TP)	mix	6.3	0.45	170	170	—	6.6	2.5	0.4	1.65	5.0	5.0	3.5	0.006	B9A	25
		osc			100	—	—	7.0	—	—	—	—	2.5	1.0	1.8		
PCF86	(TP)	mix	7.2	0.3	190	140	−1.5	8.5	2.7	0.35	4.5	3.2	6.0	3.6	0.025	B9A	64
		osc			100	—	−3.0	14.0	—	—	—	—	2.5	—	2.3		
PCF80	(TP)	mix	9.0	0.3	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.5	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		
PCF82/ 9U8	(TP)		9.5	0.3	Other data as Type ECF82/6U8												
12AD6	(H)		12.6	0.15	12.6	12.6	0	0.45	1.5	1.0	0.26	2.2	8.0	8.0	0.3	B7G	29
12BE6	(H)		12.6	0.15	Other data as Type 6BE6												
COSSOR																	
Obsolete Types																	
210SPG	(H)	mix	2.0*	0.1	150	40	0	0.4	0.8	—	0.45	7.0	14.0	21.5	—	B7	1
		osc			150	—	—	1.1	—	—	—	—	—	—	—		
41MPG	(H)	mix	4.0	1.0	250	100	−1.5	2.5	3.0	—	1.5	14.0	15.5	22.5	—	B7	2
		osc			100	—	—	3.0	—	—	—	—	—	—	—		
13PGA	(H)	mix	13.0	0.2	250	100	−3.0	3.5	2.2	—	0.75	12.0	8.0	9.5	—	B7	2
		osc			200	—	—	4.0	—	—	—	—	—	—	—		
202MPG	(H)	mix	20.0	0.2	200	100	−1.5	2.5	3.0	—	1.5	14.0	15.5	22.5	—	B7	2
		osc			100	—	—	3.0	—	—	—	—	—	—	—		
203THA	(TH_2)		20.0	0.3	Other data as Type 4THA												
Replacement Types																	
1A7	(H)	mix	1.4*	0.05	90	45	0*	0.6	0.7	0.6	0.25	—	7.0	10.0	0.5	IO	76
		osc			90	—	—	1.2	—	—	—	—	3.4	4.4	0.9		
210PG	(H)	mix	2.0*	0.1	150	40	0	0.4	0.8	—	0.45	7.0	14.0	21.5	—	B7	1
		osc			150	—	—	1.1	—	—	—	—	—	—	—		
220TH	(TH)	mix	2.0*	0.2	120	60	0	0.6	1.7	—	0.25	7.0	6.5	23.0	0.04	B7	34
		osc			100	—	—	1.7	—	—	—	—	—	—	—		
4THA	(TH_2)	mix	4.0	1.5	250	100	−2.0	3.5	5.5	—	0.85	10.0	8.0	14.0	0.001	B7	3
		osc			100	—	—	1.5	—	—	—	—	—	—	—		

(Continued)

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
COSSOR (*Continued*)																	
Replacement Types (Continued)																	
41STH	(TH_z)	mix	4.0	1.15	250	100	−1.5	3.0	4.0	—	0.6	12.0	6.5	14.5	0.001	B7	3
		osc			100	—	—	2.0	—	—	—	—	—	—	—		
OM10	(TH_z)	mix	6.3	0.2	250	100	−2.0	2.7	3.8	0.6	0.7	11.0	5.0	11.9	0.002	IO	3
		osc			70	—	—	3.0	—	—	—	—	5.9	—	—		
202STH	(TH_z)	mix	20.0	0.2	250	100	−1.5	3.0	4.0	—	0.6	12.0	6.5	14.5	0.001	B7	3
		osc			100	—	—	2.0	—	—	—	—	—	—	—		
302THA	(TH_z)		30.0	0.2	Other data as Type 4THA												
Current Types																	
DK91	(H)	mix	1.4*	0.05	90	45	0	0.8	1.9	0.8	0.25	15.0	7.0	7.5	0.4	B7G	3
DK92/ 1AC6	(H)	mix	1.4*	0.05	85	60	0	0.7	0.15	0.65	0.325	6.0	7.5	8.5	0.4	B7G	54
		osc			—	—	—	—	—	—	—	—	—	—	—		
DK96	(H)	mix	1.4*	0.025	85	68	0	0.6	0.14	0.8	0.3	6.0	7.6	8.4	0.36	B7G	54
		osc			—	—	—	—	—	—	—	—	—	—	—		
7S7	(TH)	mix	6.3	0.3	250	100	−2.0	1.8	3.0	1.25	0.525	20.0	5.0	8.0	0.03	B8B	8
		osc			150	—	—	5.0	—	—	—	—	—	—	—		
ECF80	(TP)	mix	6.3	0.43	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.2	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		
ECH42/ 6TH	(TH_z)	mix	6.3	0.23	250	85	−2.0	3.2	3.75	1.0	0.71	11.0	4.0	9.2	0.1	B8A	3
		osc			115	—	—	4.2	—	—	—	—	5.5	2.3	1.2		
ECH81	(TH)	mix	6.3	0.3	250	103	−2.0	3.25	6.7	1.0	0.775	—	4.8	7.9	0.006	B9A	24
		osc			100	—	—	13.5	—	—	—	—	2.6	2.1	1.0		
PCF80/ 8A8	(TP)	mix	9.0	0.3	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.5	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		
PCF82	(TP)	mix	9.5	0.3	170	170	—	6.6	2.5	0.4	1.65	5.0	5.0	2.6	0.01	B9A	25
		osc			100	—	—	7.0	—	—	—	—	2.5	0.4	1.8		
14S7	(TH)	mix	12.6	0.15	Other data as Type 7S7												
UCH42/ 14ITH	(TH_z)	mix	14.0	0.1	200	85	−2.0	3.2	3.35	1.25	0.69	13.0	4.0	9.2	0.1	B8A	3
		osc			110	—	—	4.2	—	—	—	—	5.5	2.3	1.2		
UCH81	(TH)	mix	19.0	0.1	200	120	−2.6	3.7	8.1	1.0	0.78	—	4.8	7.9	0.006	B9A	24
		osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
EDISWAN MAZDA																	
Obsolete Types																	
FC141	(H)	mix	1.4*	0.05	82	45	0	0.55	0.6	0.6	0.25	—	—	—	—	MO	5
		osc			75	—	—	1.2	—	—	—	—	—	—	—		
TP22	(TP)	mix	2.0*	0.25	150	60	−1.5	1.2	0.4	1.6	0.5	3.0	9.25	10.0	0.03	B9	1
		osc			100	—	—	0.8	—	—	—	—	4.5	6.5	4.5		
TP23	(TP)	mix	2.0*	0.25	120	60	−1.5	0.55	0.95	1.6	0.25	8.0	9.25	12.25	0.02	B7	34
		osc			80	—	—	2.5	—	—	—	—	13.75	8.75	4.5		
TP25	(TP)	mix	2.0*	0.2	120	60	−1.5	0.58	0.92	1.3	0.26	8.0	6.5	8.0	0.01	MO	23
		osc			80	—	—	2.5	—	—	—	—	9.0	3.75	2.0		
TP26	(TP)	mix	2.0*	0.2	103	65	−2.0	1.2	0.3	1.4	0.55	3.0	6.75	8.25	0.02	MO	22
		osc			65	—	—	0.9	—	—	—	—	3.75	4.25	2.0		
AC/TH1	(TH)	mix	4.0	1.3	250	100	−3.0	3.0	6.0	1.6	0.75	9.0	9.5	11.5	0.0015	B7	3
		osc			80	—	—	4.5	—	—	—	—	10.25	4.0	2.25		
AC/TH1A	(TH)	mix	4.0	1.3	250	100	−3.0	3.0	6.0	1.6	0.75	9.0	9.25	11.5	0.001	MO	12
		osc			80	—	—	4.5	—	—	—	—	10.5	4.0	2.25		
AC/TP	(TP)	mix	4.0	1.25	250	200	−5.0	6.5	2.5	0.9	0.7	3.0	8.0	7.75	0.07	B9	2
		osc			150	—	—	1.5	—	—	—	—	5.25	4.25	2.5		
6C31	(TH)	mix	6.3	0.85	250	100	−3.0	3.0	6.05	1.6	0.75	9.0	9.5	13.0	0.001	IO	3
		osc			80	—	—	5.0	—	—	—	—	11.5	4.4	3.0		
TP1340	(TP)	mix	13.0	0.4	250	200	−5.0	6.5	2.5	0.9	0.7	3.0	8.0	7.75	0.07	B9	2
		osc			150	—	—	1.5	—	—	—	—	5.25	4.25	2.5		
TH232	(TH)	mix	23.0	0.2	150	100	−3.0	3.0	6.0	1.0	0.65	9.0	9.5	11.5	0.0015	B7	3
		osc			80	—	—	4.5	—	—	—	—	10.25	4.0	2.25		
TH233	(TH)	mix	23.0	0.2	175	100	−3.0	2.6	5.6	1.3	0.64	8.0	9.25	11.25	0.0005	MO	12
		osc			80	—	—	4.5	—	—	—	—	10.5	3.5	2.4		
TH2320	(TH)	mix	23.0	0.2	150	100	−3.0	3.0	6.0	1.2	0.75	9.0	9.5	11.5	0.0015	B7	3
		osc			80	—	—	4.5	—	—	—	—	10.25	4.0	2.25		
TP2620	(TP)	mix	26.0	0.2	250	200	−5.0	6.5	2.5	0.9	0.7	3.0	8.0	7.75	0.07	B9	2
		osc			150	—	—	1.5	—	—	—	—	5.25	4.25	2.5		
Replacement Types																	
1C1 / 1R5	(H)	mix	1.4*	0.05	90	67.5	0	1.6	3.2	0.6	0.3	37.0	7.0	7.5	0.4	B7G	3
TH41	(TH)	mix	4.0	1.3	250	100	−3.0	3.0	6.05	1.6	0.75	9.0	9.25	11.0	0.001	MO	12
		osc			80	—	—	5.0	—	—	—	—	10.5	3.75	2.4		
6C9	(TH)	mix	6.3	0.45	250	100	−2.5	3.0	6.0	3.0	0.65	9.0	8.3	3.0	0.003	B8A	3
		osc			80	—	—	5.0	—	—	—	—	7.7	1.7	1.8		
6C10	(TH_z)	mix	6.3	0.225	250	100	−2.5	3.6	3.75	1.03	0.71	17.0	4.0	9.2	0.05	B8A	3
		osc			115	—	—	5.0	—	—	—	—	6.4	2.7	1.5		

(Continued)

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
EDISWAN MAZDA (*Continued*)																	
Replacement Types (Continued)																	
10C1	(TH)	mix	28.0	0.1	175	100	−2.5	3.0	6.0	2.2	0.65	9.0	8.3	3.0	0.003	B8A	3
		osc			80	—	—	5.0	—	—	—	—	7.7	1.7	1.8		
10C2	(TP)	mix	28.0	0.1	150	150	0	4.7	1.3	—	2.1	3.25	7.5	2.6	0.012	B8A	19
		osc			80	—	—	5.0	—	—	—	—	4.1	1.6	1.7		
Current Types																	
1C2	(H)	mix	1.4*	0.05	85	60	0	0.7	0.15	0.65	0.325	5.7	7.5	8.5	0.4	B7G	54
		osc			30	—	—	1.6	—	—	—	—	4.0	5.0	—		
1C3	(H)	mix	1.4*	0.025	85	68	0	0.6	0.14	0.8	0.3	5.7	7.4	8.1	0.36	B7G	54
		osc			35	—	—	1.5	—	—	—	—	3.9	4.8	—		
6C12	(TH)	mix	6.3	0.3	250	103	−2.0	3.25	6.7	1.0	0.775	12.0	4.8	7.9	0.006	B9A	24
		osc			100	—	—	4.5	—	—	—	—	2.6	2.1	1.0		
6H1	(H_z)		6.3	0.2	250	100	−2.2	2.3	2.7	1.0	0.56	12.0	4.3	9.25	0.06	B7G	76
30C17 (T,VMP)		mix	7.4	0.3	170	155	—	6.4	2.0	0.4	4.9	3.0	6.6	3.1	0.008	B9A	42
		osc			100	—	—	5.0	—	—	—	—	3.5	2.6	1.8		
30C1	(TP)	mix	9.0	0.3	170	145	—	6.8	2.0	0.8	2.0	5.0	6.1	4.9	0.013	B9A	25
		osc			120	—	—	6.0	—	—	—	—	3.1	2.9	1.7		
30C15	(TP)	mix	9.0	0.3	164	138	—	7.6	2.3	0.6	3.3	3.7	6.7	5.0	0.014	B9A	42
		osc			120	—	—	6.0	—	—	—	—	3.2	3.2	1.6		
10C14	(TH)	mix	19.0	0.1	200	119	−2.6	3.7	8.1	1.0	0.78	14.0	4.8	7.9	0.006	B9A	24
		osc			100	—	—	4.5	—	—	—	—	2.6	2.1	1.0		

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
EMITRON																	
Current Types																	
6BE6	(H)		6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.475	10.0	7.2	8.6	0.3	B7G	29
7S7	(TH)	mix	6.3	0.3	250	100	−2.0	1.8	3.0	1.25	0.525	20.0	5.0	8.0	0.03	B8B	8
		osc			150	—	—	5.0	—	—	—	—	—	—	—		
14S7	(TH)	mix	12.6	0.15	Other data as Type 7S7												

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
FERRANTI																	
Obsolete Types																	
VHTA	(H)	mix	13.0	0.2	250	100	−1.5	3.2	5.6	0.5	0.65	15.0	15.0	16.0	0.3	B7	2
		osc			100	—	—	1.3	—	—	—	—	—	—	—		
VHTS	(H)	mix	13.0	3.0	200	100	−3.0	2.6	5.1	0.5	0.65	15.0	15.0	16.0	0.3	B7	2
		osc			100	—	—	1.2	—	—	—	—	—	—	—		
Replacement Types																	
1AC6/ DK92	(H)		1.4*	0.05	85	60	0	0.7	0.15	0.65	0.325	6.0	7.5	8.5	0.4	B7G	54
1R5/DK91	(H)		1.4*	0.05	90	45	0	0.8	1.9	0.8	0.25	15.0	7.0	7.0	0.4	B7G	3
VHT2A	(H)	mix	2.0*	0.1	120	45	0	—	1.9	0.75	0.35	10.0	11.5	7.0	0.3	B7	1
		osc			120	—	—	—	—	—	—	—	6.0	5.0	4.0		
VHT4	(H)	mix	4.0	1.0	250	100	−3.0	2.6	5.1	0.5	0.7	15.0	15.0	16.0	0.3	B7	2
		osc			100	—	—	1.2	—	—	—	—	11.0	9.0	5.0		
6A7 / 6A8	(H)	mix	6.3	0.3	250	100	−3.0	3.5	2.7	0.36	0.55	20.0	12.0	12.0	0.06	UX7 / IO	1 / 1
		osc			100	—	—	4.0	—	—	—	—	6.5	5.0	0.8		
6K8	(TH_z)	mix	6.3	0.3	250	100	−3.0	2.5	6.0	0.6	0.35	7.5	4.6	4.8	0.08	IO	4
		osc			100	—	—	3.8	—	—	—	—	6.5	3.4	1.8		
6SA7 / 6SA7GT/G	(H)		6.3	0.3	250	100	−2.0	3.5	8.5	1.0	0.45	—	9.5	12.0	0.13	IO / IO	6 / 7
7S7	(TH)	mix	6.3	0.3	250	100	−2.0	1.8	3.0	1.25	0.525	20.0	5.0	8.0	0.03	B8B	8
		osc			150	—	—	5.0	—	—	—	—	—	—	—		
12K8			12.6	0.15	Other data as Type 6K8											IO	4
Current Types																	
1AB6/ DK96	(H)		1.4*	0.025	85	64	0	0.6	1.5	1.0	0.3	6.0	7.6	8.4	0.36	B7G	54
6BE6/EK90	(H)		6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.475	10.0	7.2	8.6	0.3	B7G	29
ECH42/ 6CU7	(TH_z)	mix	6.3	0.23	250	85	−2.0	3.0	3.0	1.0	0.75	11.0	4.0	9.2	0.1	B8A	3
		osc			115	—	—	4.8	—	—	—	—	5.5	2.3	1.2		
ECH81/ 6AJ8	(TH)	mix	6.3	0.3	250	100	−2.0	3.2	6.7	1.0	0.775	13.0	4.8	7.9	0.006	B9A	24
		osc			100	—	0	4.5	—	—	—	—	2.6	2.1	1.0		
9A8/ PCF80	(TP)	mix	9.0	0.3	170	170	—	6.3	2.5	0.7	2.05	4.0	5.5	3.8	0.02	B9A	25
		osc			100	—	—	14.0	—	—	—	—	2.5	1.8	1.5		
9U8/ PCF82	(TP)	mix	9.5	0.3	250	110	—	5.2	2.0	0.4	1.0	5.0	5.0	2.5	0.006	B9A	25
		osc			170	—	—	3.3	—	—	—	—	2.5	0.4	1.8		
UCH81	(TH)	mix	19.0	0.1	200	120	−2.6	3.7	8.1	1.0	0.78	—	4.8	7.9	0.006	B9A	24
		osc			100	—	0	4.5	—	—	—	—	2.6	2.1	1.0		

Type	Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
G.E.C.															
Obsolete Types															
X14 mix	1.4	0.05	90	45	0	0.45	0.6	—	0.25	10.0	7.0	7.6	0.47	IO	76
osc			90	—	—	—	—	—	—	—	5.1	5.4	1.25	B7	1
X41 (TH_x) mix	4.0	1.2	250	80	−1.5	2.3	8.8	—	0.64	12.0	7.2	17.0	0.46	B7	3
osc			150	—	—	2.2	—	—	—	—	15.5	6.0	—		
MX40 (H) mix	4.0	1.0	250	80	−3.0	—	—	—	0.5	10.0	13.3	—	0.3	B7	2
osc			150	—	—	—	—	—	—	—	11.3	9.4	2.6		
X61M (TH_x) mix	6.3	0.3	250	100	−3.0	3.0	3.0	0.7	0.62	15.0	4.9	11.5	—	IO	3
osc			100	—	—	3.3	—	—	—	—	10.5	6.0	—		
X76M (TH_x) mix	13.0	0.16	150	100	−3.0	3.0	3.0	0.7	0.62	15.0	4.7	13.1	—	IO	3
osc			100	—	—	3.3	—	—	—	—	10.6	6.3	—		
Replacement Types															
DK91/X17 (H) mix	1.4*	0.05	90	67.5	0	—	—	0.75	0.25	—	7.0	7.0	0.4	B7G	3
osc			—	—	—	—	—	—	—	—	3.8	—	0.1		
X14 (H) mix	1.4*	0.05	90	45	0	0.45	0.6	—	0.25	10.0	7.0	7.6	0.47	IO	76
osc			90	—	—	—	—	—	—	—	5.1	5.4	1.25		
X22 (H) mix	2.0*	0.15	150	70	0	—	—	—	0.35	10.0	13.8	20.5	0.4	B7	1
osc			150	—	—	—	—	—	—	—	7.8	6.4	1.47		
X24 (TH_x) mix	2.0*	0.2	150	60	−1.5	0.7	1.7	—	0.25	6.0	7.5	17.5	—	B7	3
osc			100	—	—	2.1	—	—	—	—	19.0	9.5	—		
ECF80 (TP) mix	6.3	0.43	250	180	−5.8	5.7	1.4	1.5	2.1	5.0	2.2	3.8	0.025	B9A	25
osc			100	—	−2.0	14.0	—	—	—	—	2.5	1.8	1.5		
EK90/X727 (H)	6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.475	10.0	7.2	8.6	0.3	B7G	29
X61M (TH_x) mix	6.3	0.3	250	100	−3.0	3.0	3.0	0.7	0.62	15.0	4.9	11.5	—	IO	3
osc			100	—	—	3.3	—	—	—	—	10.5	6.0	—		
X63 (H) mix	6.3	0.3	250	100	−3.0	—	—	—	0.49	25.0	8.0	8.9	0.38	IO	1
osc			100	—	—	—	—	—	—	—	7.3	5.9	0.83		
X79 (TH_o) mix	6.3	0.3	250	75	0	4.5	3.4	0.7	0.78	10.0	4.1	4.34	0.08	B9A	21
osc			100	—	—	4.5	—	—	—	—	5.47	1.5	1.48		
X65 (TH_x) mix	6.3	0.3	250	100	−3.0	3.0	3.0	2.5	0.23	10.0	3.5	5.5	0.12	IO	3
osc			100	—	—	3.3	—	—	—	—	9.6	5.5	2.0		
X78 (TH_x) mix	6.3	0.3	250	75	0	4.5	3.4	0.7	0.78	10.0	4.1	4.34	0.11	B7G	48
osc			100	—	—	4.5	—	—	—	—	—	—	—		
X81 (TH_x) mix	6.3	0.3	250	100	−2.0	3.0	2.4	1.0	0.65	10.0	6.0	11.5	0.07	B8B	8
osc			100	—	—	3.6	—	—	—	—	9.6	4.8	1.15		
PCF80 (TP) mix	9.0	0.3	170	170	−2.0	10.0	10.0	—	2.18	4.0	4.5	4.0	0.02	B9A	25
osc			100	—	−2.0	14.0	—	—	—	—	3.0	0.5	2.0		
PCF82 (TP) mix	9.5	0.3	250	110	—	5.2	2.0	0.4	1.0	5.0	5.0	2.5	0.006	B9A	25
osc			170	—	—	3.3	—	—	—	—	2.5	0.4	1.8		
X101 (TH_x) mix	19.0	0.1	Other data as Type X81												
X109 (TH_x) mix	19.0	0.1	175	75	0	4.3	3.6	0.25	0.71	10.0	4.1	4.34	0.11	B9A	21
osc			100	—	—	4.5	—	—	—	—	—	—	—		
Current Types															
DK92/X20 (H) mix	1.4	0.05	85	60	0	0.7	0.15	0.65	0.39	7.0	7.5	8.5	0.4	B7G	54
osc			30	—	—	1.6	—	—	—	—	—	—	—		
DK96/X25 (H) mix	1.4	0.025	85	68	0	0.6	0.14	0.08	0.3	5.7	7.4	8.1	0.36	B7G	54
osc			35	—	—	1.5	—	—	—	—	3.9	4.8	—		
X18 (H)	1.4*	0.05	90	67.5	0	1.15	2.85	0.6	0.32	15.0	7.0	7.0	0.4	B7G	54
ECH81/ (TH) mix	6.3	0.3	250	100	−2.0	6.5	3.8	—	0.775	13.0	4.8	7.9	0.006	B9A	24
X719 osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
LZ329 (TP) mix	9.0	0.3	170	170	−2.8	6.5	2.0	0.8	2.2	5.0	5.5	3.8	0.025	B9A	25
osc			100	—	—	10.0	—	—	—	—	2.3	0.3	1.5		
UCH81/ (TH) mix	19.0	0.1	200	120	2.6	3.7	8.1	1.0	0.78	—	4.8	7.9	0.006	B9A	24
X119 osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
X118 (TH) mix	28.0	0.1	175	100	−2.5	3.0	6.0	2.2	0.65	9.0	8.3	3.0	0.003	B8A	3
osc			80	—	—	5.0	—	—	—	—	7.7	1.8	—		

MARCONI

Obsolete Types																	
X14 (H)	mix	1.4*	0.05	90	45	0	0.45	0.6	—	0.25	10.0	7.0	7.6	0.47	IO	76
	osc			90	—	—	—	—	—	—	—	5.1	5.4	1.25		
X21 (H)	mix	2.0*	0.1	150	70	0	—	—	—	0.24	10.0	11.8	19.2	0.55	B7	1
	osc			150	—	—	—	—	—	—	—	7.4	—	1.8		
X23 (TH_x)	mix	2.0*	0.3	150	60	−1.5	0.7	—	—	0.25	6.0	6.3	17.5	0.05	B7	34
	osc			150	—	—	2.1	—	—	—	—	21.5	9.8	4.1		
X24 (TH_x)	mix	2.0*	0.2	150	60	−1.5	0.7	1.7	—	0.25	6.0	7.5	17.5	—	B7	3
	osc			100	—	—	2.1	—	—	—	—	19.0	9.5	—		

(Continued)

Type	Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MARCONI (*Continued*)															
Obsolete Types (Continued)															
X42 (H) mix	4.0	0.6	250	100	−3.0	—	—	—	0.49	25.0	8.6	—	0.95	B7	2
osc			200	—	—	—	—	—	—	—	8.7	7.0	1.64		
X64 (H) mix	6.3	0.3	250	150	−6.0	—	—	—	0.31	18.0	11.3	8.5	1.0	IO	2
osc			—	—	—	—	—	—	—	—	6.0	—	—		
X30 } (H) mix	13.0	0.3	250	100	−3.0	4.0	—	—	0.75	10.0	15.6	—	0.36	B7	2
X32 } osc			150	—	—	3.0	—	—	—	—	12.2	9.5	2.66		
X31 (TH_x) mix	13.0	0.3	250	80	−1.5	—	—	—	0.55	12.0	7.0	21.5	0.046	B7	3
osc			150	—	—	—	—	—	—	—	17.0	8.5	3.56		
X71M (TH_x) mix	13.0	0.16	250	100	−3.0	—	—	—	0.62	15.0	5.0	14.1	0.085	IO	3
osc			100	—	—	—	—	—	—	—	11.0	7.1	2.3		
X101 (TH_x) mix	19.0	0.1	Other data as Type X81												
Replacement Types															
X22 (H) mix	2.0*	0.15	150	70	0	—	—	—	0.35	10.0	13.8	20.5	0.4	B7	1
osc			150	—	—	—	—	—	—	—	7.8	6.4	1.47		
MX40 (H) mix	4.0	0.65	250	90	−1.5	1.6	2.0	—	0.6	10.0	13.3	—	0.3	B7	2
osc			150	—	—	—	—	—	—	—	11.3	9.4	2.6		
X41Met (TH_x) mix	4.0	1.2	250	70	−1.5	2.3	2.8	—	0.64	12.0	7.2	17.0	0.46	B7	3
osc			150	—	—	2.2	—	—	—	—	15.5	6.0	—		
X61M (TH_x) mix	6.3	0.3	250	100	−3.0	2.0	3.0	—	0.62	15.0	4.9	11.5	—	IO	3
osc			100	—	—	5.0	—	—	—	—	10.5	6.0	—		
X63 (H) mix	6.3	0.3	250	100	−3.0	5.0	2.7	0.3	0.49	25.0	8.0	8.9	0.38	IO	1
osc			100	—	—	—	—	—	—	—	7.3	5.9	0.83		
X65 (TH_x) mix	6.3	0.3	250	100	−3.0	1.75	—	2.5	0.225	10.0	3.5	5.5	0.21	IO	3
osc			100	—	—	4.75	—	—	—	—	10.4	5.5	2.0		
Current Types															
DK91/X17 (H) mix	1.4*	0.05	90	67.5	0	1.6	3.2	0.6	0.3	—	7.0	7.0	0.4	B7G	3
osc			—	—	—	—	—	—	—	—	3.8	—	—		
DK92/X18 (H)	1.4*	0.05	85	60	0	0.7	1.6	0.65	0.325	15.0	7.0	7.0	0.4	B7G	54
DK96 (H)	1.4	0.25	85	6.8	0	0.6	0.14	0.8	0.3	5.6	7.4	8.1	0.36	B7G	54
ECH21/ (TH) mix	6.3	0.33	250	100	−2.0	3.0	6.2	1.4	0.75	10.0	6.8	9.5	0.002	B8B	42
X143 osc			100	—	—	12.0	—	—	—	—	4.5	3.5	1.1		
ECH35/ (TH_x) mix	6.3	0.225	250	100	−2.0	3.0	3.0	1.3	0.65	11.0	5.0	10.0	0.003	IO	3
X147 osc			100	—	—	3.3	—	—	—	—	9.0	3.0	1.6	B10	
ECH42/ (TH_x) mix	6.3	0.225	250	85	−2.0	3.0	3.0	1.0	0.75	10.0	4.0	9.2	0.05	B8A	3
X150 osc			100	—	—	10.0	—	—	—	—	—	—	—		
ECH81/ (TH) mix	6.3	0.3	250	100	−2.0	3.25	6.7	0.7	0.775	13.0	4.8	7.9	0.006	B9A	24
X719 osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
X78 (TH_x) mix	6.3	0.3	250	75	0	4.5	3.4	0.7	0.78	10.0	4.1	4.34	0.11	B7G	48
osc			100	—	—	10.0	—	—	2.8	—	—	—	—		
X79 (TH_x) mix	6.3	0.3	250	75	0	4.5	3.4	0.7	0.78	10.0	4.1	4.34	0.08	B9A	21
osc			100	—	—	10.0	—	—	2.8	—	5.47	1.5	1.48		
X148/7S7 (TH) mix	6.3	0.3	250	100	−2.0	1.5	3.0	1.25	2.0	—	5.0	8.0	0.03	B8B	8
osc			250	—	—	5.0	—	—	—	—	—	—	—		
X727/6BE6 (H)	6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.475	10.0	7.2	8.6	0.3	B7G	29
PCF80/ (TP) mix	9.0	0.3	170	170	−5.5	5.2	1.5	0.7	2.1	4.0	4.5	4.0	0.02	B9A	25
LZ319 osc			100	—	−2.0	14.0	—	—	—	—	3.0	0.05	2.0		
X76M (TH_x) mix	13.0	0.16	175	70	−3.0	4.0	3.5	0.1	0.62	15.0	4.7	13.1	—	IO	3
osc			100	—	—	3.5	—	—	—	—	10.6	6.3	—		
UCH42/ (TH_x) mix	14.0	0.1	200	85	−2.0	3.0	3.0	1.25	0.75	13.0	4.0	9.2	0.05	B8A	3
X142 osc			100	—	—	10.0	—	—	—	—	6.4	2.7	1.5		
UCH81 (TH) mix	19.0	0.1	200	119	−2.6	3.7	8.1	1.0	0.775	—	4.8	7.9	0.006	B9A	24
osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
X109 (TH_x) mix	19.0	0.1	175	75	0	4.3	3.6	0.25	0.71	10.0	4.1	4.34	0.11	B9A	21
osc			100	—	—	10.0	—	—	2.8	—	—	—	—		
X145 (TH) mix	28.0	0.1	175	100	−2.5	3.0	6.0	2.2	0.65	9.0	8.3	3.0	0.003	B8A	3
osc			175	—	—	5.0	—	—	3.8	—	7.7	1.7	1.8		

MULLARD

Obsolete Types																	
1A7 (H)		1.4*	0.05	90	45	0	0.6	0.7	0.06	0.25	7.0	7.0	10.0	0.5	IO	76
DK1 (H)	mix	1.4*	0.05	90	45	0	0.55	0.6	0.06	0.25	—	—	—	—	Ct8	31
	osc			90	—	—	1.2	—	—	—	—	—	—	—		
FC2 (O)	mix	2.0*	0.1	135	70	0	0.95	3.75	—	0.2	13.0	9.9	14.5	0.057	B7	1
	osc			135	—	—	—	—	—	—	—	—	—	—		
FC2A } (O)	mix	2.0*	0.13	135	45	0	0.07	0.7	2.5	0.27	12.0	9.0	11.0	0.07	{ B7	1
KK32 }	osc			135	—	—	2.1	—	—	—	—	6.3	8.5	—	{ IO	76
KCF30 (TP)	mix	2.0*	0.2	120	60	−1.5	0.8	0.92	1.6	0.26	8.0	6.5	8.0	0.01	IO	98
	osc			100	—	—	—	—	—	—	—	9.0	4.0	2.0		

(Continued)

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MULLARD *(Continued)*																	
Obsolete Types (Continued)																	
TH2	(TH_z)	mix	2.0*	0.23	135	60	−1.5	0.95	1.6	0.6	0.43	7.0	8.5	15.0	0.002	B7	34
		osc			100	—	—	4.0	—	—	—	—	21.0	1.4	7.7		
TH4A	(TH_z)	mix	4.0	1.5	275	100	−2.5	3.25	7.0	1.5	0.75	11.0	8.0	13.0	—	B7	3
		osc			100	—	—	22.0	—	—	—	—	16.5	3.1	3.25		
TH4B	(TH)	mix	4.0	1.45	250	100	−2.5	3.25	6.0	1.5	0.75	11.0	8.4	13.8	0.16	B7	3
		osc			100	—	—	9.5	—	—	—	—	13.6	3.5	—		
6A7	(H)	mix	6.3	0.3	250	100	−3.0	3.5	2.7	0.36	0.55	20.0	9.5	12.0	0.26	UX7	1
		osc			100	—	—	4.0	—	—	—	—	6.0	4.6	0.8		
ECH2	(TH)	mix	6.3	0.95	250	100	−2.5	3.25	6.0	1.5	0.75	11.0	8.4	13.8	0.015	Ct8	1
		osc			100	—	—	9.5	—	—	—	—	17.0	3.5	3.5		
ECH33	(TH_z)	mix	6.3	0.2	250	100	−2.0	3.0	3.0	1.3	0.65	11.0	4.9	9.0	0.003	IO	3
		osc			100	—	—	3.3	—	—	—	—	8.8	4.4	1.4		
EK32 / EK2	(O)	mix	6.3	0.2	250	50	−2.0	1.0	0.8	2.0	0.55	21.0	9.0	10.5	0.1	IO	1
		osc			200	—	—	2.5	—	—	—	—	6.0	5.0	—	Ct8	2
FC13 / FC13C	(O)	mix	13.0	0.2	200	70	−1.5	1.6	3.8	2.0	0.6	12.0	9.0	12.5	0.1	Ct8	2
		osc			90	—	—	2.0	—	—	—	—	9.4	6.1	—	B7	2
TH13C	(TH_z)		13.0	0.31	Other data as Type TH4A												
TH21C	(TH_z)	mix	21.0	0.2	250	70	−1.5	4.0	6.0	1.5	1.0	28.0	7.4	14.3	—	B7	3
		osc			130	—	—	6.0	—	—	—	—	—	—	1.8		
TH22C	(TH_z)		29.0	0.2	Other data as Type TH4A												
TH30C	(TH_z)	mix	29.0	0.2	250	100	−2.5	3.25	6.0	1.5	0.75	11.0	8.4	13.8	—	B7	3
		osc			100	—	—	9.5	—	—	—	—	13.6	3.5	—		
Replacement Types																	
DF97			1.4*	0.025	85	47	0	0.54	0.8	0.5	0.265	16.8	3.7	7.5	0.01	B7G	59
DK32	(H)	mix	1.4*	0.05	90	45	0	0.6	0.7	0.6	0.25	10.0	7.0	10.0	0.5	IO	76
		osc			90	—	—	1.2	—	—	—	—	4.0	4.4	0.9		
DK40	(O)	mix	1.4*	0.05	90	67.5	0	1.0	0.25	1.0	0.425	11.2	6.9	9.6	0.16	B8A	25
		osc			65.5	—	—	2.6	—	—	—	—	—	—	—		
DK91	(H)		1.4*	0.05	90	45	0	0.8	1.9	0.8	0.25	15.0	7.0	7.5	0.4	B7G	3
DK92	(H)	mix	1.4*	0.05	85	60	0	0.7	0.15	0.65	0.325	6.0	7.5	7.5	0.4	B7G	54
		osc			30	—	—	1.4	—	—	—	—	—	—	—		
DK96	(H)	mix	1.4*	0.025	85	68	0	0.6	0.14	0.8	0.3	5.6	7.4	8.1	0.36	B7G	54
		osc			35	—	—	1.5	—	—	—	—	—	—	—		
FC4	(O)	mix	4.0	0.65	250	70	−1.5	1.6	3.8	—	0.6	12.0	9.0	12.5	0.06	B7	2
		osc			90	—	—	2.0	—	—	—	—	9.4	6.1	—		
ECF82	(TP)	mix	6.3	0.45	250	117	0	5.2	1.9	—	1.9	4.25	5.0	2.6	0.01	B9A	25
		osc			150	—	−1.0	18.0	—	0.005	—	—	2.5	0.4	1.8		
ECH3	(TH_z)	mix	6.3	0.2	250	100	−2.0	3.0	3.0	1.3	0.65	11.0	4.9	9.0	0.003	Ct8	1
		osc			100	—	—	3.3	—	—	—	—	8.8	4.4	1.4		
ECH21	(TH)	mix	6.3	0.33	250	100	−2.0	3.0	6.2	1.4	0.75	14.0	6.8	9.5	0.002	B8B	42
		osc			160	—	—	4.5	—	—	—	—	4.5	3.5	1.1		
6A8					Other data (except connections) as Type 6A7											IO	1
6K8	(TH_z)	mix	6.3	0.3	250	100	−3.0	2.5	6.0	0.6	0.36	7.5	6.6	3.5	0.03	IO	4
		osc			100	—	—	3.8	—	—	—	—	6.0	3.2	1.1		
ECH35	(TH_z)	mix	6.3	0.225	250	100	−2.0	3.0	3.0	1.3	0.65	11.0	5.0	10.0	0.0003	IO	3
		osc			100	—	—	3.3	—	—	—	—	9.0	3.0	1.6		
ECH42	(TH_z)	mix	6.3	0.23	250	85	−2.0	3.0	3.0	1.0	0.75	11.0	4.0	9.2	0.1	B8A	3
		osc			115	—	—	4.8	—	—	—	—	5.5	2.3	1.2		
CCH35	(TH_z)		7.0	0.2	Other data as Type ECH35												
PCF82	(TP)	mix	9.5	0.3	170	170	0	6.6	2.5	—	1.65	4.2	5.0	2.6	0.01	B9A	25
		osc			150	—	−1.0	18.0	—	—	—	—	2.5	0.4	1.8		
12K8			12.8	0.15	Other data as Type 6K8												
UCH42	(TH_z)	mix	14.0	0.1	200	85	−2.0	3.0	3.0	1.0	0.75	13.0	3.8	9.2	0.1	B8A	3
		osc			100	—	—	3.1	—	—	—	—	5.5	2.3	1.2		
UCH21	(TH)	mix	20.0	0.1	200	100	−2.0	3.5	6.5	1.0	0.75	13.0	6.8	9.5	0.002	B8B	42
		osc			120	—	—	4.1	—	—	—	—	4.5	3.5	1.1		
UCF80	(TP)	mix	27.0	0.1	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.5	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		
Current Types																	
ECF80	(TP)	mix	6.3	0.43	250	180	−5.8	5.7	1.4	1.5	2.1	5.0	5.2	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.5	1.8	1.5		
ECH81	(TH)	mix	6.3	0.3	250	250	−2.0	6.5	3.8	0.7	0.775	13.0	4.8	7.9	0.006	B9A	24
		osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
ECH83	(TH)	mix	6.3	0.3	12.6	12.6	—	0.15	0.35	1.5	0.2	2.5	4.8	7.9	0.01	B9A	24
		osc			12.6	—	0	0.75	0.042	—	—	—	2.6	2.1	1.0		
EK90	(H)		6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.475	10.0	7.2	8.6	0.3	B7G	29
PCF86	(TP)	mix	8.0	0.3	190	140	—	8.5	2.7	0.6	4.5	3.2	6.0	3.5	0.012	B9A	64
		osc			100	—	−3.0	14.0	—	0.003	—	—	2.4	1.1	2.0		
PCF80	(TP)	mix	9.0	0.3	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.5	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		

(Continued)

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MULLARD *(Continued)*																	
Current Types (Continued)																	
PCF84	(TP)	mix	9.0	0.3	170	170	0	8.0	2.7	0.4	2.5	—	—	—	—	B9A	65
		osc			100	—	−2.0	14.0	—	0.004	—	—	—	—	—		
HK90	(H)		12.6	0.15	Other data as Type EK90												
UCH81	(TH)	mix	19.0	0.1	200	120	−2.6	3.7	8.1	1.0	0.78	—	4.8	7.9	0.006	B9A	24
		osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
TUNGSRAM																	
Obsolete Types																	
MH206	(H)	mix	2.0*	0.06	135	67.5	−3.0	1.2	2.5	0.4	0.28	10.0	10.5	9.0	0.25	B7	1
VO2 / VO2S	(O)	mix	2.0*	0.13	135	45	0	0.7	0.6	2.5	0.27	11.0	9.1	14.3	0.07	B7	1
		osc			135	—	—	1.3	—	—	—	—	6.6	8.7	—	Ct8	31
VX2 / VX2S	(H)	mix	2.0*	0.13	150	60	−1.0	1.0	1.1	2.0	0.47	14.0	7.8	15.0	0.0015	B7	28
																Ct8	31
2A7	(H)	mix	2.5	0.8	250	100	−3.0	3.5	2.2	0.36	—	—	—	—	—	UX7	1
		osc			135	—	—	2.3	—	—	—	—	5.0	6.0	0.8		
MO465	(O)	mix	4.0	0.65	250	70	−1.5	1.6	3.8	1.0	0.6	12.0	9.0	12.5	0.06	B7	2
		osc			70	—	—	2.0	—	—	—	—	9.4	6.1	—		
TX4	(TH_z)	mix	4.0	1.0	300	80	−1.5	5.5	6.0	1.5	1.0	17.0	6.2	13.0	0.05	B7	3
		osc			150	—	—	4.0	—	—	—	—	—	3.7	1.8		
VO4	(O)	mix	4.0	0.65	250	70	−1.5	1.6	3.8	1.0	0.6	12.0	9.0	12.5	0.06	B7	2
		osc			90	—	—	—	—	—	—	—	9.4	6.1	—		
VX4 / VX4S	(H)	mix	4.0	0.65	250	80	−2.0	1.8	1.5	1.5	0.55	12.5	7.4	15.7	0.003	B7	35
																Ct8	11
																IO	1
6E8	(TH_z)	mix	6.3	0.3	250	—	−2.0	—	—	—	—	—	—	—	—	IO	3
6TH8	(TH_z)	mix	6.3	0.6	300	80	−1.5	5.5	6.0	2.0	1.0	17.0	6.2	13.0	0.05		
		osc			150	—	—	4.0	—	—	—	—	9.0	3.7	1.8		
ECH2	(TH_z)	mix	6.3	0.95	250	100	−2.5	3.25	7.0	1.5	0.75	12.0	8.0	13.0	0.8	Ct8	1
		osc			100	—	—	5.0	—	—	—	—	16.5	3.1	3.25		
ECH3	(TH_z)	mix	6.3	0.2	250	100	−2.0	3.2	3.0	1.0	0.65	10.0	4.7	9.0	0.0015	Ct8	1
		osc			150	—	—	3.3	—	—	—	—	8.8	4.6	1.5		
EH2	(H)	mix	6.3	0.2	250	100	−3.0	4.2	2.8	2.0	0.4	19.0	—	—	—	Ct8	16
EK2	(O)	mix	6.3	0.2	250	60	−2.0	1.1	1.0	2.0	0.55	12.0	8.4	11.3	—	Ct8	2
		osc			200	—	—	2.5	—	—	—	—	6.0	4.5	—		
EK3	(O)	mix	6.3	0.65	250	100	−2.5	2.5	5.5	2.0	0.65	17.0	14.5	15.0	0.1	Ct8	2
		osc			100	—	—	6.0	—	—	—	—	14.0	7.5	—		
VO13	(O)	mix	13.0	0.2	250	70	−1.5	1.6	3.8	1.0	0.6	12.0	8.7	12.5	0.06	B7	2
		osc			90	—	—	2.5	—	—	—	—	9.1	6.0	—		
VO13S	(O)	mix	13.0	0.2	250	70	−1.5	1.6	3.8	1.0	0.6	12.0	8.7	12.5	0.06	Ct8	2
		osc			90	—	—	2.5	—	—	—	—	9.1	6.0	—		
VX13 / VX13S	(H)	mix	13.0	0.2	250	80	−2.0	1.8	1.5	1.5	0.55	12.5	7.4	15.7	0.003	B7	35
																Ct8	11
TX21	(TH_z)	mix	21.0	0.2	250	80	−1.5	5.5	6.0	1.5	1.0	17.0	6.2	13.0	0.05	B7	3
		osc			150	—	—	4.0	—	—	—	—	—	2.9	1.7		
TH29	(TH_z)	mix	29.0	0.2	250	100	−2.0	3.5	7.5	1.5	0.75	12.0	8.0	12.8	—	B7	3
		osc			125	—	—	—	—	—	—	—	16.5	3.0	3.2		
Replacement Types																	
MH4105	(H)	mix	4.0	0.5	250	100	−3.0	3.5	2.2	0.36	0.52	35.0	8.5	9.0	0.3	B7	2
		osc			200	—	—	4.0	—	—	—	—	7.0	5.5	1.0		
TH4A	(TH_z)	mix	4.0	1.45	250	100	−2.0	3.5	7.5	1.5	0.75	12.0	8.0	12.8	—	B7	3
		osc			125	—	—	5.0	—	—	—	—	16.5	3.0	3.2		
Current Types																	
1AB6	(H)	mix	1.4*	0.025	85	68	0	0.6	0.14	0.8	0.3	6.0	7.6	8.4	0.36	B7G	54
		osc			—	—	—	—	—	—	—	—	—	—	—		
1AC6	(H)	mix	1.4*	0.05	85	60	0	0.7	0.15	0.65	0.325	6.0	7.5	8.5	0.4	B7G	54
		osc			—	—	—	—	—	—	—	—	—	—	—		
1R5	(H)	mix	1.4*	0.05	90	45	0	0.8	1.9	0.8	0.25	15.0	7.0	7.5	0.4	B7G	3
6A7 / 6A8	(H)	mix	6.3	0.3	250	100	−3.0	3.5	2.7	0.36	0.55	20.0	12.0	12.0	0.06	UX7	1
		osc			100	—	—	4.0	—	—	—	—	6.5	5.0	0.8	IO	1
6AJ8	(TH)	mix	6.3	0.3	250	100	−2.0	6.5	3.8	0.7	0.775	13.0	4.8	7.9	0.006	B9A	24
		osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
6BE6/EK90	(H)	mix	6.3	0.3	250	100	−1.5	3.0	7.1	1.0	0.47	10.0	7.2	8.6	0.3	B7G	29
6CU7	(TH_z)	mix	6.3	0.23	250	85	−2.0	3.0	3.0	1.0	0.75	11.0	4.0	9.2	0.1	B8A	3
		osc			115	—	—	4.8	—	—	—	—	5.5	2.3	1.2		
6K8	(TH_z)	mix	6.3	0.3	250	100	−3.0	2.5	6.0	0.6	0.35	7.5	6.6	3.5	0.03	IO	4
		osc			100	—	—	3.8	—	—	—	—	6.0	3.2	1.1		
6SA7	(H)	mix	6.3	0.3	250	100	−2.0	3.5	8.5	1.0	0.45	—	9.5	12.0	0.13	IO	6
6U8	(TP)	mix	6.3	0.45	250	100	0	5.2	1.9	0.4	1.9	4.0	5.0	2.6	0.01	B9A	25
		osc			150	—	—	5.7	—	—	—	—	2.5	0.4	1.8		
ECF80	(TP)	mix	6.3	0.43	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.2	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		

(Continued)

Type			Heater		Volts			Current (mA)		r_a (MΩ)	g_c (mA/V)	Osc. Volts (peak)	Capacitances (pF)			Base	
			Volts	Amps	Anode	Screen	Grid	Anode	Screen				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
TUNGSRAM (*Continued*)																	
Current Types (Continued)																	
ECH35	(TH_z)	mix	6.3	0.3	250	100	−2.0	2.3	3.0	1.25	0.65	10.0	4.5	9.0	0.0015	IO	3
		osc			150	—	—	—	—	—	—	—	8.8	4.0	1.5		
CCH35	(TH_z)		7.0	0.2	Other data as Type ECH35												
7HG8	(TP)	mix	8.0	0.3	170	150	−1.2	10.0	3.3	0.735	4.5	2.3	6.0	3.5	<2.5	B9A	64
		osc			100	—	−3.0	14.0	—	—	—	—	2.2	1.1	2.2		
9A8	(TP)	mix	9.0	0.3	170	170	−5.5	5.2	1.5	0.87	2.1	5.0	5.5	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		
9U8	(TP)	mix	9.5	0.3	170	100	0	5.2	1.9	0.4	1.9	4.0	5.0	2.6	0.01	B9A	25
		osc			150	—	—	5.7	—	—	—	—	2.5	0.4	1.8		
12A8			12.6	0.15	Other data as Type 6A7											IO	1
12BE6			12.6	0.15	Other data as Type 6BE6											B7G	29
12K8			12.6	0.15	Other data as Type 6K8											IO	4
12SA7			12.6	0.15	Other data as Type 6SA7											IO	6
14K7	(TH_z)	mix	14.0	0.1	200	85	−2.0	3.0	3.0	1.0	0.75	13.0	3.8	9.2	0.1	B8A	3
		osc			100	—	—	3.1	—	—	—	—	5.5	2.3	1.2		
UCH81	(TH)	mix	19.0	0.1	200	120	−2.6	3.7	8.1	1.0	0.78	—	4.8	7.9	0.006	B9A	24
		osc			100	—	0	13.5	—	—	—	—	2.6	2.1	1.0		
UCF80	(TP)	mix	27.0	0.1	170	170	−5.5	5.2	1.5	0.07	2.1	5.0	5.5	3.8	0.025	B9A	25
		osc			100	—	−2.0	14.0	—	—	—	—	2.3	0.3	1.5		
AMERICAN																	
Current Types																	
1AE5	(H)	mix	1.25*	0.06	45	45	0	0.9	2.0	0.2	0.2	—	—	—	—	Wires	
1C8	(H)	mix	1.25*	0.04	30	30	0	0.32	0.75	0.3	0.1	—	6.5	4.0	0.25	—	—
1E8	(H)	mix	1.25*	0.04	67.5	45	—	1.0	1.5	0.4	0.15	—	—	—	—	Wires	
2G22			1.25*	0.05	22.5	22.5	0	0.2	0.3	0.5	0.06	—	—	—	—	Wires	
1A7	(H)	mix	1.4*	0.05	90	45	0	0.6	0.7	0.6	0.25	7.0	7.0	10.0	0.5	IO	76
		osc			90	—	—	1.2	—	—	—	—	3.4	4.4	0.9		
1B7	(H)	mix	1.4*	0.1	90	45	0	1.5	1.3	0.35	0.35	7.0	7.0	7.5	0.34	IO	76
		osc			90	—	—	1.6	—	—	—	—	4.0	4.2	0.9		
1LA6	(H)	mix	1.4*	0.05	90	45	0	0.55	0.6	0.75	0.25	7.0	7.7	8.0	0.4	B8B	29
		osc			90	—	—	1.2	—	—	—	—	2.9	3.3	0.6		
1LB6	(H)	mix	1.4*	0.05	90	67.5	0	0.4	2.2	—	—	—	—	—	—	B8B	30
1LC6	(H)	mix	1.4*	0.05	90	35	0	0.75	0.7	0.65	—	35.0	9.0	5.5	0.3	B8B	29
1A6	(H)	mix	2.0*	0.06	135	67.5	−3.0	1.7	2.5	0.4	0.27	10.0	10.5	9.0	0.25	UX6	1
1D7		osc			135	—	—	2.3	—	—	—	—	5.0	6.0	0.8	IO	76
1C6	(H)	mix	2.0*	0.12	135	67.5	−3.0	1.3	2.5	0.6	0.3	10.0	10.0	14.0	0.26	UX6	1
1C7		osc			135	—	—	3.1	—	—	—	—	4.8	5.5	1.2	IO	76
6BA7	(H)	mix	6.3	0.3	250	100	−1.0	3.8	10.0	1.0	0.95	7.0	9.5	8.3	0.19	B9A	3
6D8	(H)	mix	6.3	0.15	250	100	−3.0	3.5	2.6	0.4	0.55	20.0	8.0	11.0	0.2	IO	1
		osc			135	—	—	4.3	—	—	—	—	5.5	4.6	1.1		
6F7	(TP)	mix	6.3	0.3	250	100	−3.0	2.8	0.6	2.0	0.3	7.0	3.2	12.5	0.008	UX7	13
6P7		osc			100	—	—	2.4	—	—	—	—	2.5	3.0	2.0	IO	5
6J8	(TH)	mix	6.3	0.3	250	100	−3.0	1.3	2.9	4.0	0.29	20.0	4.4	8.8	0.01	IO	3
		osc			100	—	—	5.0	—	—	—	—	11.7	5.5	2.2		
6L7	(H)	mix	6.3	0.3	250	150	−6.0	3.3	8.3	1.0	0.35	18.0	7.5	11.0	0.001	IO	2
6P8	(TH_z)	mix	6.3	0.8	250	75	−2.0	1.5	1.4	—	—	—	—	—	—	IO	4
		osc			100	—	—	2.2	—	—	—	—	—	—	—		
6SA7	(H)	mix	6.3	0.3	250	100	−2.0	3.5	8.5	1.0	0.45	—	9.5	12.0	0.13	IO	6
6SA7GT/G																IO	7
6SB7Y		mix	6.3	0.3	250	100	−1.0	3.8	10.0	1.0	0.95	7.0	9.6	9.2	0.15	IO	6
7A8	(O)	mix	6.3	0.15	250	100	−3.0	3.0	3.2	0.7	0.55	20.0	7.5	9.0	0.15	B8B	9
		osc			100	—	—	4.2	—	—	—	—	3.8	3.4	0.6		
7B8	(H)	mix	6.3	0.3	250	100	−3.0	3.5	2.7	0.36	0.55	20.0	9.0	12.0	0.2	B8B	9
14B8		osc	12.6	0.15	100	—	—	4.0	—	—	—	—	4.8	3.0	0.8		
7D7	(TH_z)	mix	6.3	0.45	250	—	−3.0	—	—	—	—	—	—	—	—	B8B	8
		osc			150	—	—	3.5	—	—	—	—	—	—	—		
7J7	(TH)	mix	6.3	0.15	250	100	−3.0	1.3	2.9	1.5	0.3	20.0	5.5	7.5	0.01	B8B	8
14J7		osc	12.6	0.15	100	—	—	5.4	—	—	—	—	8.5	2.0	1.0		
12A8			12.6	0.15	Other data as Type 6A8												
12BA7			12.6	0.15	Other data as Type 6BA7												
12SA7			12.6	0.15	Other data as Type 6SA7												
12SY7	(H)	mix	12.6	0.15	250	100	−2.0	3.5	8.5	1.0	0.45	28.0	9.0	12.0	0.13	IO	6
20J8	(TH)	mix	20.0	0.15	250	100	−3.0	1.5	3.4	—	—	—	—	—	—	IO	2
		osc			100	—	−1.5	1.5	—	—	—	—	—	—	—		
21A7	(TH_z)	mix	21.0	0.16	250	100	−3.0	1.3	2.8	—	0.27	—	—	—	—	B8B	8
		osc			150	—	—	3.5	—	—	—	—	—	—	—		
26D6	(H)	mix	26.5	0.07	250	100	−1.5	3.0	7.8	1.0	0.47	26.5	7.5	14.0	0.3	B7G	29

SCREENED TETRODES and PENTODES

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
BRIMAR															
Obsolete Types															
1L4		1.4*	0.05	90	90	0	4.5	2.0	0.35	1.03	3.6	7.5	0.008	B7G	2
1LD5	(SD)	1.4*	0.05	90	45	0	0.6	0.1	0.75	0.58	3.2	6.0	0.18	B8B	31
1LN5		1.4*	0.05	90	90	0	1.6	0.35	1.1	0.8	3.4	0.8	0.007	B8B	28
32E		2.0*	0.06	135	67.5	−3	1.7	0.4	1.0	0.6	—	—	—	UX4	2
34E		2.0*	0.06	135	67.5	−3	2.8	1.0	0.6	0.6	—	—	—	UX4	2
24A/24E	(TT)	2.5	1.75	250	90	−3	4.0	1.7	0.6	1.0	—	—	—	UX5	2
8A1		4.0	1.0	200	80	−1.5	3.5	0.7	0.6	4.0	10.7	8.0	0.007	B5	2
														B7	5
9A1	(VM)	4.0	1.0	200	80	−1.5	5.0	1.0	0.6	4.25	11.0	8.0	0.007	B5	2
														B7	5
6U7	(VM)	6.3	0.3	250	100	−3.0	8.2	2.0	0.8	1.6	4.7	6.5	0.007	IO	8
7R7	(DD)	6.3	0.3	250	100	−1.0	6.2	1.6	1.0	3.2	5.6	5.3	0.004	B8B	13
36	(TT)	6.3	0.3	250	90	−3	3.2	1.7	0.55	1.1	—	—	—	UX5	2
39/44		6.3	0.3	250	90	−3	5.8	1.4	1.0	1.1	—	—	—	UX5	2
77		6.3	0.3	250	100	−3.0	2.3	0.5	1.0	1.25	4.7	11.0	0.007	UX6	2
78	(VM)	6.3	0.3	250	100	−3.0	7.0	1.7	0.8	1.45	4.5	11.0	0.007	UX6	2
12C8	(DD)	12.6	0.15	Other data as Type 6B8											
12J7		12.6	0.15	Other data as Type 6J7											
12K7	(VM)	12.6	0.15	Other data as Type 6K7											
14H7	(VM)	12.6	0.15	Other data as Type 7H7											
14R7	(DD)	12.6	0.15	Other data as Type 7R7											
8D2		13.0	0.2	250	100	−3.0	2.0	0.5	1.5	1.25	4.0	10.0	0.01	B7	6
9D2	(VM)	13.0	0.2	250	125	−3.0	10.5	2.6	0.6	1.65	4.0	10.0	0.005	B7	6
Replacement Types															
1S5	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.625	2.2	2.4	0.2	B7G	5
1T4	(VM)	1.4*	0.05	90	67.5	0	3.5	1.4	0.5	0.9	3.6	7.5	0.01	B7G	2
1U5	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.625	—	—	0.1	B7G	11
DAF96/1AH5	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	5
DF96/1AJ4		1.4	0.025	85.0	64.0	0	1.65	0.55	1.0	0.85	3.3	7.8	0.01	B7G	2
6AK5		6.3	0.175	180	120	−1.8	7.7	2.4	0.5	5.1	4.0	2.1	0.03	B7G	14
6B8	(DD)	6.3	0.3	250	125	−3.0	9.0	2.3	0.6	1.12	4.5	10.0	0.005	IO	15
6C6		6.3	0.3	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	UX6	2
6D6	(VM)	6.3	0.3	250	100	−3.0	8.2	2.0	0.8	1.6	4.7	6.5	0.007	UX6	2
6J7		6.3	0.3	250	100	−3.0	2.0	0.5	1.5	1.25	4.6	12.0	0.007	IO	8
6K7	(VM)	6.3	0.3	250	125	−3.0	10.5	2.6	0.6	1.65	5.0	12.0	0.007	IO	8
7B7	(VM)	6.3	0.15	250	100	−3.0	8.5	1.7	0.75	1.75	5.0	6.0	0.007	B8B	3
7H7	(VM)	6.3	0.3	250	150	−2.5	9.5	3.5	0.8	4.2	8.0	7.0	0.007	B8B	3
9D6															
6065 (SQ)	(VM)	6.3	0.2	250	200	−2.5	8.0	2.1	1.0	2.5	4.5	7.0	0.004	B7G	21
EBF80/6N8	(VM, DD)	6.3	0.3	250	85	−2.0	5.0	1.75	1.5	2.2	4.2	4.9	0.0025	B9A	12
EF41	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.0	2.2	4.7	8.0	0.002	B8A	7
UF41	(VM)	12.6	0.1	200	115	−3.0	7.2	2.1	1.0	2.3	5.0	7.0	0.002	B8A	7
Current Types															
6AM6/8D3															
6064 (SQ)		6.3	0.3	250	250	−2.0	10.0	2.6	1.0	7.5	7.5	3.2	0.01	B7G	21
6AU6		6.3	0.3	250	150	−1.0	10.8	4.3	1.0	5.2	5.5	5.0	0.0035	B7G	16
6BA6	(VM)														
5749 (SQ)		6.3	0.3	250	100	−1.0	11.0	4.2	1.5	4.4	5.5	5.0	0.0035	B7G	16
6BH6		6.3	0.15	250	150	−1.0	7.4	2.9	1.4	4.6	5.4	4.4	0.0035	B7G	32
6BJ6	(VM)	6.3	0.15	250	100	−1.0	9.2	3.3	1.3	3.8	4.5	5.5	0.0035	B7G	32
6BR7/8D5															
6059 (SQ)		6.3	0.15	250	100	−3.0	2.1	0.6	2.3	1.25	4.0	4.0	0.01	B9A	35
6BR8	(TP)	6.3	0.45	170	110	−0.9	9.5	3.3	0.5	5.25	5.0	2.6	0.01	B9A	67
6BS7		6.3	0.15	250	100	−3.0	2.1	0.6	2.3	1.25	4.0	4.0	0.01	B9A	20
6BW7		6.3	0.3	180	180	−1.5	9.5	3.5	0.6	9.3	9.5	3.5	0.01	B9A	10
8D8		6.3	0.15	250	140	−2.0	3.0	0.6	2.5	1.9	4.0	3.9	1.3	B9A	23
9D7	(VM)	6.3	0.3	250	100	−1.3	10.0	3.3	0.75	8.4	9.0	3.0	0.01	B9A	10
6870 (SQ)		6.3	0.6†	250	250	−3.4	25.0	3.5	0.23	8.5	8.5	7.0	0.025	B9A	44
7032 (SQ)	Gating Heptode	6.3	0.3	250	100	(g_1) −2.0	4.5	7.2	—	(g_1-a) 1.8	—	—	—	B7G	29
						(g_3) 0				(g_3-a) 0.5					
ECF80	(TP)	6.3	0.43	250	200	−3.2	7.0	1.8	0.9	5.5	5.5	3.8	0.025	B9A	25
EF80/6BX6		6.3	0.3	170	170	−2.0	10.0	2.5	0.5	7.4	7.5	3.3	0.007	B9A	10
EF89/6DA6	(VM)	6.3	0.2	250	100	−1.95	9.0	3.0	1.0	3.5	5.5	5.1	0.002	B9A	35
EF183	(VM)	6.3	0.3	190	90	−2.0	12.0	4.5	0.5	13.0	9.0	3.0	0.005	B9A	10
EF184		6.3	0.3	200	200	−2.5	10.0	3.8	0.35	15.0	10.0	3.0	0.005	B9A	10
PCF80	(TP)	9.0	0.3	170	170	−2.0	10.0	2.8	0.4	6.2	5.5	3.8	0.025	B9A	25
12AC6	(VM)	12.6	0.15	12.6	12.6	0	0.55	0.2	0.5	0.73	4.3	5.0	0.005	B7G	16
12AU6		12.6	0.15	Other data as Type 6AU6											

(Continued)

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
BRIMAR (*Continued*)															
Current Types (Continued)															
12BA6	(VM)	12.6	0.15	Other data as Type 6BA6											
12BL6	(VM)	12.6	0.15	12.6	12.6	0*	1.4	0.55	0.5	1.35	5.2	5.4	0.005	B7G	16
PCL84	(TP)	15.0	0.3	220	220	−3.3	18.0	3.2	0.15	9.5	9.0	4.5	0.1	B9A	53
		* Grid current biasing Rg_1=2.2 MΩ													
COSSOR															
Obsolete Types															
215SG		2.0*	0.15	150	60	0	2.5	0.5	0.3	1.1	9.0	7.0	0.001	B4	2
220SG		2.0*	0.2	150	60	0	3.1	0.6	0.2	1.6	9.0	7.0	0.001	B4	2
220VS	(VM)	2.0*	0.2	150	60	0	3.6	0.9	0.4	1.6	9.5	7.0	0.001	B4	2
220VSG	(VM)	2.0*	0.2	150	60	0	5.0	0.7	0.11	1.6	9.5	7.0	0.001	B4	2
2201PT		2.0	0.2	120	60	−1.5	2.2	0.5	0.4	1.0	—	—	—	B7	26
4TSP, 4TPB		4.0	1.0	250	150	−3.0	12.0	—	—	8.0	—	—	—	B7, B7	5, 6
41MTS		4.0	1.0	250	100	0	5.0	—	—	1.6	—	—	—	B7	20
42PTB		4.0	2.0	200	200	−3.0	34.0	6.5	0.1	8.5	—	—	—	B7	6
MS/PenA		4.0	1.0	200	150	−2.5	9.0	5.0	0.09	4.0	—	—	—	B5	2
MSGHA		4.0	1.0	200	80	−1.5	2.1	—	0.5	2.0	—	—	—	B5	2
MSGLA		4.0	1.0	200	80	−1.5	5.25	—	0.2	3.75	—	—	—	B5	2
MVS/PenB	(VM)	4.0	1.0	200	100	−1.5	4.3	1.3	0.6	2.2	9.5	8.5	0.003	B7	6
MVSG	(VM)	4.0	1.0	200	80	−1.5	7.5	0.75	0.2	2.5	—	—	—	B5	2
6SG7	(VM)	6.3	0.3	250	150	−2.5	9.2	3.4	1.0	4.0	8.5	7.0	0.003	IO	14
6SH7		6.3	0.3	250	150	−1.0	10.8	4.1	0.9	4.9	8.5	7.0	0.003	IO	14
6SK7	(VM)	6.3	0.3	250	100	−3.0	9.2	2.6	0.8	2.0	6.5	7.5	0.005	IO	10
6SS7	(VM)	6.3	0.15	250	100	−3.0	9.0	2.0	1.0	1.85	5.5	7.0	0.004	IO	10
12SG7	(VM)	12.6	0.15	250	150	−2.5	9.2	3.4	1.0	4.0	8.5	7.0	0.003	IO	14
13SPA		13.0	0.2	200	100	−3.0	2.3	0.6	1.0	1.25	5.0	9.0	0.003	B7	6
13VPA	(VM)	13.0	0.2	200	100	−3.0	7.0	1.7	0.8	1.8	5.0	9.0	0.003	B7	6
202SPB		20.0	0.2	250	100	−1.5	4.8	1.3	0.8	2.8	9.5	8.5	0.003	B7	6
Replacement Types															
1N5		1.4*	0.05	90	90	0	1.2	0.3	1.5	0.75	3.0	10.0	0.007	IO	77
210SPT		2.0*	0.1	150	60	0	2.95	0.75	0.6	1.3	8.0	7.0	0.008	B7	4
210VPT	(VM)	2.0*	0.1	150	60	0	2.9	0.75	0.6	1.1	8.0	7.0	0.008	B7	4
4TSA		4.0	1.0	250	100	0	5.0	—	—	1.6	—	—	—	B7	38
41MPT		4.0	1.0	250	100	−1.5	12.0	2.0	0.2	4.8	—	—	—	B7	5
42MPT		4.0	2.0	200	200	−3.0	34.0	—	—	8.5	—	—	—	B7	5
42SPT		4.0	2.0	250	250	−10.5	64.0	15.0	—	11.0	18.0	7.5	0.08	B7	5
MS/Pen, MS/PenB		4.0	1.0	200	100	−1.5	4.8	1.3	0.8	2.8	9.5	8.5	0.003	B7, B7	5, 6
MVS/Pen	(VM)	4.0	1.0	200	100	−1.5	4.3	1.3	0.6	2.2	9.5	8.5	0.003	B7	6
6J7		6.3	0.3	250	100	−3.0	2.0	0.5	1.5	1.25	5.0	12.0	0.007	IO	8
6K7	(VM)	6.3	0.3	250	125	−3.0	10.5	2.6	0.6	1.65	5.0	12.0	0.007	IO	8
202VP, 202VPB	(VM)	20.0	0.2	250	100	−1.5	4.3	1.3	0.6	2.2	9.5	8.5	0.003	B7, B7	5, 6
Current Types															
DAF91	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.63	2.2	2.4	0.2	B7G	5
DAF96	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	5
DF91	(VM)	1.4*	0.05	90	67.5	0	3.5	1.5	0.5	0.9	3.6	7.5	0.01	B7G	2
DF96		1.4*	0.025	85	64.0	0	1.65	0.55	1.0	0.75	3.3	7.8	0.01	B7G	2
210VPA	(VM)	2.0*	0.1	150	60	0	2.9	1.0	0.6	1.1	9.0	7.0	0.004	B7	4
6AS6		6.3	0.175	120	120	−2.0	5.2	3.5	0.11	3.2	4.0	3.0	0.02	B7G	32
6CB6		6.3	0.3	200	150	—	9.5	2.8	0.6	6.2	6.3	1.9	0.02	B7G	32
6CH6		6.3	0.75	250	250	−4.5	40.0	6.0	0.05	11.0 (Video output valve Pa=12W)				B9A	19
6F33		6.3	0.35	200	100	−1.5	5.0	2.0	—	4.35	7.3	4.5	0.01	B7G	21
7B7	(VM)	6.3	0.15	250	100	−3.0	8.5	2.0	0.7	1.7	5.0	7.0	0.005	B8B	3
61SPT		6.3	1.27	250	250	−10.5	64.0	15.0	—	11.0	18.0	7.5	0.08	IO	49
E180F		6.3	0.3	190	160	−1.0	13.0	3.0	0.035	16.5	7.9	2.9	0.02	B9A	45
EL91/6AM5		6.3	0.2	250	250	—	16.0	2.5	—	2.6	—	—	—	B7G	25
EF41/62VP		6.3	0.2	250	100	−2.5	6.0	1.7	1.0	2.2	4.7	8.0	0.002	B8A	7
EF50/63SPT		6.3	0.3	250	250	−2.0	10.0	3.0	1.0	6.5	8.3	5.2	0.007	B9G	1
EF80		6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.007	B9A	10
EF85	(VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10
EF86		6.3	0.2	250	140	−2.0	3.0	0.6	2.5	1.8	4.0	5.5	0.025	B9A	23
EF89	(VM)	6.3	0.2	250	100	−2.0	9.0	3.0	1.0	3.5	5.5	5.1	0.002	B9A	36
EF91		6.3	0.3	250	250	−2.0	10.0	2.5	1.0	7.5	7.5	3.2	0.007	B7G	21
EF183	(VM)	6.3	0.3	200	90	−2.0	12.0	4.5	0.5	12.5	9.0	3.0	<0.0055	B9A	10
EF184		6.3	0.3	170	170	−2.0	10.0	4.1	0.33	15.6	10.0	3.0	<0.005	B9A	10

(*Continued*)

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
COSSOR (*Continued*)															
Current Types (Continued)															
OM5B		6.3	0.2	250	100	−2.0	3.0	0.8	2.5	1.8	—	—	—	IO	8
OM5C		Characteristics as OM5B but suitable for use in d.c. amplifiers													
OM6	(VM)	6.3	0.2	250	100	−2.5	6.0	1.8	1.0	2.0	6.3	7.8	0.003	IO	8
UF41	(VM)	12.6	0.1	170	100	−2.5	6.0	1.75	1.0	2.2	5.0	7.0	0.002	B8A	7
UF89	(VM)	12.6	0.1	170	110	−2.0	12.0	3.9	0.525	3.8	5.5	5.1	0.002	B9A	36
UBF80/171DDP	(VM, DD)	17.0	0.1	170	85	−2.0	5.0	1.75	0.9	2.2	4.0	4.6	0.0025	B9A	12
UBF89	(VM, DD)	19.0	0.1	200	100	−1.5	11.0	3.3	0.6	4.5	5.0	5.2	0.002	B9A	12
EDISWAN MAZDA															
Obsolete Types															
1F2, 1L4		1.4*	0.05	90	67.5	0	2.9	1.2	0.6	0.92	3.6	7.5	0.008	B7G	2
SP141		1.4*	0.05	83	83	0	1.3	0.5	0.6	0.75	7.5	10.0	0.006	MO	4
S215A		2.0*	0.15	150	60	0	2.0	0.3	1.3	1.1	8.5	12.5	0.002	B4	2
S215B		2.0*	0.15	150	60	−1.0	1.5	0.3	0.9	1.2	10.5	10.5	0.002	B4	2
S215VM	(VM)	2.0*	0.15	150	60	−1.4	1.0	0.15	1.4	0.8	10.0	8.5	0.002	B4	2
SG215		2.0*	0.15	150	60	−1.5	1.5	0.25	1.5	0.85	8.5	11.0	0.003	B4	2
SP210		2.0*	0.1	120	120	−1.0	1.1	0.33	2.0	1.2	10.0	11.0	0.005	B7	4
SP215		2.0*	0.15	150	80	−1.5	2.1	0.7	0.8	1.6	10.0	8.5	0.007	B7	4
SP22		2.0*	0.1	120	120	−1.0	1.1	0.38	1.35	1.2	7.75	12.5	0.0055	MO	1
VP22	(VM)	2.0*	0.1	120	60	−1.5	1.2	0.32	1.3	0.8	7.0	12.5	0.0045	MO	1
VP23	(VM)	2.0*	0.05	120	60	−1.5	1.45	0.5	1.45	1.08	8.0	11.0	0.006	MO	1
VP210	(VM)	2.0*	0.1	120	60	−1.5	1.1	0.38	1.45	0.82	8.75	11.0	0.004	B7	4
VP215	(VM)	2.0*	0.15	120	60	−1.5	1.1	0.38	0.9	0.82	10.0	8.5	0.007	B7	4
AC/SG		4.0	1.0	200	60	−1.5	4.5	0.8	0.9	1.9	10.0	10.0	0.001	B5	2
AC/SG/VM	(VM)	4.0	1.0	200	60	−2.0	5.8	0.9	0.72	1.8	10.0	10.0	0.001	B5	2
AC/SP1		4.0	1.0	200	200	−3.0	4.9	4.1	0.12	2.65	13.0	8.75	0.0035	B7	5
AC/S2		4.0	1.0	200	80	−1.5	7.0	0.8	0.6	4.3	12.0	10.0	0.001	B5	2
AC/S1VM	(VM)	4.0	1.0	200	75	−1.5	5.6	1.5	0.55	1.1	6.5	11.5	0.001	B5	2
AC/S2Pen		4.0	1.0	250	100	−1.5	8.0	2.7	0.7	4.6	13.5	8.75	0.009	B7	5
AC/SP3		4.0	1.0	250	100	−1.7	7.9	2.5	0.55	7.0	14.5	11.0	0.005	B7	6
AC/VP1	(VM)	4.0	0.65	250	200	−2.8	7.4	1.85	1.0	2.0	9.5	8.0	0.003	B7	5
AC/VP2	(VM)	4.0	0.65	250	200	−2.8	7.4	1.85	1.0	2.0	7.0	9.5	0.0025	B7	6
SP41		4.0	0.95	200	200	−1.5	10.9	2.7	0.7	8.5	10.75	5.25	0.005	MO	11
V453		4.0	0.65	250	100	−1.75	4.5	0.8	—	2.0	6.75	11.6	0.004	MO	11
VP41	(VM)	4.0	0.65	250	200	−2.7	7.7	2.0	1.3	2.0	6.5	11.5	0.0025	MO	11
6F11		6.3	0.2	250	100	−1.8	4.4	1.35	2.8	2.2	5.3	6.7	0.004	B8A	8
6F16	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.0	2.2	4.7	8.0	0.002	B8A	18
SP61		6.3	0.6	Other data as Type SP41											
SP1320		13.0	0.2	250	100	−1.5	4.4	0.9	—	2.05	10.0	8.0	0.005	B7	5
VP133	(VM)	13.0	0.2	150	150	−2.7	8.0	2.2	0.7	2.1	7.0	11.5	0.0025	MO	11
VP1320	(VM)	13.0	0.2	250	100	−1.7	5.0	1.1	2.0	2.0	9.75	8.5	0.005	B7	5
VP1321	(VM)	13.0	0.2	250	200	−2.8	7.4	1.85	1.0	2.0	9.75	8.5	0.005	B7	5
VP1322	(VM)	13.0	0.2	250	200	−2.8	7.4	1.85	1.0	2.0	7.0	9.5	0.0025	B7	6
SP181		18.0	0.2	200	200	−1.5	10.9	2.7	0.7	8.5	10.75	5.25	0.005	MO	11
10F3		22.0	0.1	200	200	−2.35	6.0	1.6	—	6.5	9.0	4.6	0.0065	B8A	8
SP2220		22.0	0.2	250	200	−3.0	4.9	4.1	0.12	2.65	13.0	8.75	0.0035	B7	5
Replacement Types															
1F3, 1T4	(VM)	1.4*	0.05	90	45	0	1.8	0.65	0.8	0.75	3.6	7.5	0.01	B7G	2
1FD9, 1S5	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.63	2.2	3.3	0.4	B7G	5
SP42		4.0	0.95	200	115	−1.25	20.0	5.0	—	8.5	10.0	7.0	0.0055	MO	11
6F1		6.3	0.35	200	200	−1.8	10.0	2.6	0.9	9.0	9.0	4.6	0.0065	B8A	17
6F12		6.3	0.3	250	250	−2.0	10.0	2.5	0.9	7.5	7.6	3.2	0.0045	B7G	21
6F13		6.3	0.35	200	200	−1.8	10.0	2.6	0.9	9.0	9.0	4.6	0.0065	B8A	8
6F14		6.3	0.35	135	135	−1.3	27.0	6.5	—	10.6	8.8	4.6	0.007	B8A	8
6F15	(VM)	6.3	0.2	250	100	−2.5	7.0	2.0	1.7	2.3	5.1	6.8	0.0035	B8A	8
6F32		6.3	0.63	200	200	−4.5	5.1	3.45	—	3.0	10.5	5.7	0.0005	MO	11
20F2		11.0	0.2	135	135	−1.3	27.0	6.5	—	10.6	8.8	4.6	0.007	B8A	8
10F9	(VM)	13.0	0.1	175	100	−2.5	7.0	2.0	1.0	2.3	5.1	6.8	0.0035	B8A	8
10F1		22.0	0.1	200	200	−1.8	10.0	2.6	0.9	9.0	9.0	4.6	0.0065	B8A	17
Current Types															
1F1	(VM)	1.4*	0.025	85	64	0	1.65	0.55	1.0	0.85	3.3	7.8	0.01	B7G	64
1FD1	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	65
30F27	(VM)	3.7	0.3	170	140	−1.25	13.5	1.7	—	15.0	6.3	1.8	0.027	B9A	61
6F18	(VM)	6.3	0.2	175	100	−1.3	12.0	3.5	—	4.4	5.0	4.3	0.0017	B9A	10
6F19	(VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10

(*Continued*)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (MΩ)	g_m (mA/V)	Capacitances (pF) c_{gk}	Capacitances (pF) c_{ak}	Capacitances (pF) c_{ga}	Base Type	Base Ref.
EDISWAN MAZDA *(Continued)*															
Current Types (Continued)															
6F20	(VM)	6.3	0.3	170	170	−2.0	10.0	2.5	0.4	6.0	7.5	3.3	0.007	B9A	10
6F21	(VM)	6.3	0.2	250	200	−2.5	7.8	2.0	1.2	2.5	4.7	7.0	0.008	B7G	21
6F22		6.3	0.2	250	140	−2.0	3.0	0.55	2.0	1.85	4.0	5.5	0.025	B9A	23
6F23		6.3	0.3	170	170	−1.9	10.0	2.6	—	9.2	8.3	3.3	0.0065	B9A	10
6F24		6.3	0.3	170	170	−1.9	10.0	2.7	—	15.0	8.8	2.6	0.006	B9A	10
6F25	(VM)	6.3	0.3	170	90	−1.5	11.5	2.8	—	12.5	8.5	2.7	0.006	B9A	10
6F26	(VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10
6F33		6.3	0.35	200	200	−4.0	5.75	3.1	—	3.55	7.3	4.5	0.01	B7G	21
6FD12	(VM, DD)	6.3	0.3	250	100	−2.0	9.0	2.7	1.0	3.8	5.0	5.2	0.0025	B9A	12
S6F12 (SQ)		6.3	0.3	250	250	−2.0	10.0	2.5	0.9	7.5	7.6	3.2	0.0045	B7G	21
S6F33 (SQ)		6.3	0.35	200	200	−3.3	7.1	4.35	0.1	4.05	7.55	4.55	0.01	B7G	21
30F5		7.3	0.3	170	170	−1.9	10.0	2.6	—	8.8	9.0	4.4	0.0073	B9A	10
30FL1	(T, BT)	9.4	0.3	170	170	−2.1	10.0	2.5	—	7.5	7.9	3.2	0.03	B9A	49
10F18	(VM)	13.0	0.1	175	100	−1.3	12.0	3.5	—	4.4	5.0	4.3	0.0017	B9A	10
10FD12	(VM, DD)	19.0	0.1	200	100	−1.5	11.0	3.3	0.6	4.5	5.0	5.2	0.0025	B9A	12
EMITRON															
Current Types															
1S5	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.625	2.2	2.4	0.2	B7G	5
1T4	(VM)	1.4*	0.05	90	67.5	0	3.5	1.4	0.5	0.9	3.6	7.5	0.01	B7G	2
6AM6		6.3	0.3	250	250	−2.0	10.0	2.5	1.0	7.5	7.5	3.2	0.007	B7G	21
6BA6		6.3	0.3	250	100	−1.0	11.0	4.2	1.0	4.4	5.5	5.0	0.0035	B7G	16
7B7	(VM)	6.3	0.15	250	100	−3.0	8.5	1.7	0.75	1.75	5.0	7.0	0.005	B8B	3
7H7	(VM)	6.3	0.3	250	150	−2.4	10.0	3.2	0.8	4.2	8.0	6.5	0.007	B8B	3
FERRANTI															
Obsolete Types															
S2		2.0*	0.15	120	60	−1.0	2.25	0.3	0.3	1.1	—	—	0.005	B4	2
VS2	(VM)	2.0*	1.15	120	60	−2.5	2.0	0.4	0.4	1.4	—	—	0.005	B4	2
VPT4B	(VM)	4.0	1.0	250	100	−3.0	6.0	3.0	1.8	3.2	10.6	8.2	0.004	B7	5
SPTA		13.0	0.2	250	100	−2.5	2.2	0.5	1.5	1.4	8.9	8.5	0.003	B7	6
VPTA		13.0	0.2	250	100	−2.0	4.2	2.0	1.0	2.9	9.0	9.0	0.002	B7	5
VPTS		13.0	0.3	200	100	−3.0	5.5	2.0	1.0	2.6	8.8	8.4	0.002	B7	5
Replacement Types															
1N5		1.4*	0.05	90	90	0	1.2	0.3	1.5	0.75	3.0	10.0	0.007	IO	77
1S5/DAF91	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.63	2.2	2.4	0.2	B7G	5
1T4/DF91	(VM)	1.4*	0.05	90	67.5	0	3.5	1.5	0.5	0.9	3.6	7.5	0.01	B7G	2
SPT2		2.0*	0.1	120	120	0	2.8	0.9	2.0	1.5	10.0	10.5	0.008	B7	4
VPT2	(VM)	2.0*	0.1	120	60	−1.5	1.5	0.7	0.6	1.1	8.8	11.0	0.006	B4 / B7	2 / 4
SPT4A		4.0	1.0	250	100	−1.5	2.0	1.0	1.5	2.3	10.6	8.0	0.003	B7	5
VPT4	(VM)	4.0	1.0	250	100	−3.0	5.5	3.0	1.0	2.0	8.8	8.5	0.002	B5	2
6AB7	(VM)	6.3	0.45	300	200	−3.0	12.5	3.2	0.7	5.0	8.0	5.0	0.015	IO	10
6AC7		6.3	0.45	300	150	−2.0	10.0	2.5	1.0	9.0	11.0	5.0	0.015	IO	10
6AM6/EF91		6.3	0.3	250	250	−2.0	10.0	2.6	1.0	7.5	7.5	3.2	0.01	B7G	21
6B8	(DD)	6.3	0.3	250	125	−3.0	10.0	2.3	0.6	1.33	3.5	9.5	0.007	IO	15
6C6		6.3	0.3	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	UX6	2
6D6	(VM)	6.3	0.3	250	100	−3.0	8.2	2.0	0.8	1.6	4.7	6.5	0.007	UX6	2
6J7		6.3	0.3	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	IO	8
6K7	(VM)	6.3	0.3	250	125	−3.0	10.5	2.6	0.6	1.65	5.0	12.0	0.007	IO	8
6SG7	(VM)	6.3	0.3	250	150	−2.5	9.2	3.4	1.0	4.0	8.5	7.0	0.003	IO	14
6SH7		6.3	0.3	250	150	−1.5	10.8	4.1	0.9	4.9	8.5	7.0	0.003	IO	14
6SJ7		6.3	0.3	250	100	−3.0	3.0	0.8	1.0	1.65	6.0	7.0	0.005	IO	10
6SK7	(VM)	6.3	0.3	250	100	−3.0	9.2	2.6	0.8	2.0	6.5	7.5	0.005	IO	10
6SS7	(VM)	6.3	0.15	250	100	−3.0	9.0	2.0	1.0	1.85	5.5	7.0	0.004	IO	10
6U7	(VM)	6.3	0.3	250	100	−3.0	8.2	2.0	0.8	1.6	4.7	6.5	0.007	IO	8
7H7	(VM)	6.3	0.3	250	150	−2.5	9.5	3.5	0.8	3.8	8.0	7.0	0.007	B8B	3
7R7	(DD)	6.3	0.3	250	100	−1.0	5.7	1.7	1.0	3.2	5.6	5.3	0.004	B8B	13
EAF42/6CT7	(VM, SD)	6.3	0.2	250	85	−2.0	5.0	1.5	1.4	2.0	4.5	5.1	0.002	B8A	12
EF41/6CJ5	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.0	2.2	4.7	8.0	0.002	B8A	7
EF42		6.3	0.33	250	250	−2.0	10.0	2.3	0.44	9.5	9.5	4.5	0.005	B8A	8
12C8	(DD)	12.6	0.15	250	125	−3.0	10.0	2.3	0.6	1.33	3.5	9.5	0.007	IO	15
12J7		12.6	0.15	Other data as Type 6J7											
12K7	(VM)	12.6	0.15	Other data as Type 6K7											
12SJ7		12.6	0.15	Other data as Type 6SJ7											
12SK7	(VM)	12.6	0.15	Other data as Type 6SK7											
UAF42	(VM, SD)	12.6	0.1	200	85	−2.0	5.0	1.5	1.0	2.0	4.5	5.1	0.002	B8A	12
UF41	(VM)	12.6	0.1	170	100	−2.5	6.0	1.75	1.0	2.2	5.0	7.0	0.002	B8A	7

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (MΩ)	g_m (mA/V)	Capacitances (pF) c_{gk}	Capacitances (pF) c_{ak}	Capacitances (pF) c_{ga}	Base Type	Base Ref.
FERRANTI *(Continued)*															
Current Types															
DF96/1AJ4		1.4*	0.025	85.0	64.0	0	1.65	0.55	1.0	0.75	3.3	7.8	0.01	B7G	2
DAF96/1AH5	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	5
DF97		1.4*	0.025	85	60	0	1.7	0.7	0.4	0.9	3.7	7.5	0.01	B7G	59
6AG5		6.3	0.3	250	150	−1.8	7.0	2.0	0.8	5.0	6.5	1.8	0.025	B7G	14
6AK5/EF95		6.3	0.175	180	120	−2.0	7.7	2.4	0.7	5.1	3.9	2.9	0.02	B7G	14
DP61		6.3	0.175	180	120	−2.0	7.7	2.4	0.7	5.1	4.0	2.8	0.02	B7G	14
EBF80/6N8	(VM, DD)	6.3	0.3	250	85	−2.0	5.0	1.75	1.4	2.2	4.2	4.9	0.0025	B9A	12
EF80/6BX6		6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.007	B9A	10
EF85/6BY7	(VM)	6.3	0.3	250	100	−2.0	10.0	2.4	0.5	6.0	7.2	3.7	0.007	B9A	10
EF86		6.3	0.2	250	140	−2.0	3.0	0.6	2.5	1.8	3.8	5.3	0.025	B9A	23
EF89/6DA6	(VM)	6.3	0.3	250	100	−2.0	9.0	3.0	1.0	3.6	5.5	5.1	0.002	B9A	36
UF89	(VM)	12.6	0.1	170	100	−1.0	12.0	4.4	0.3	4.4	5.5	5.1	0.002	B9A	36
UBF80	(VM, DD)	17.0	0.1	170	85	−2.0	5.0	1.75	0.9	2.2	4.2	4.9	0.0025	B9A	12
UBF89	(VM, DD)	19.0	0.1	200	100	−1.5	11.0	3.3	0.6	4.5	5.0	5.2	0.0025	B9A	12
UF85	(VM)	19.0	0.1	170	100	−2.0	9.7	2.6	0.3	5.9	6.9	3.2	0.006	B9A	10
G.E.C.															
Obsolete Types															
ZD17	(SD)	1.4*	0.05	90	90	0	2.7	0.5	0.6	0.63	2.2	2.4	0.2	B7G	5
KTZ41		4.0	1.5	250	250	−1.5	18.0	5.3	—	12.0	14.0	10.5	0.008	B7	30
MS4		4.0	1.0	200	70	−1.5	2.4	0.3	—	1.1	9.9	4.8	0.002	B5	2
MSP4		4.0	1.0	250	100	−1.75	3.3	1.0	—	2.4	17.2	10.0	0.01	B5 / B7	2 / 5
MSP41		4.0	1.0	250	240	−4.0	8.5	3.2	—	3.2	17.2	10.0	0.01	B5 / B7	2 / 5
VMS4	(VM)	4.0	1.0	200	80	0	14.0	3.0	—	2.4	11.3	7.7	0.002	B5	2
VMS4B	(VM)	4.0	1.0	200	80	0	8.0	1.5	—	2.9	12.0	8.1	0.0024	B5	2
KTZ63		6.3	0.3	250	100	−2.0	1.0	0.25	1.5	1.23	4.7	7.5	0.0038	IO	8
Z62		6.3	0.45	300	150	−2.0	10.0	2.7	0.75	7.5	10.9	8.0	0.02	IO	8
Z90		6.3	0.3	250	250	−2.0	10.0	3.0	—	6.3	8.2	5.4	0.007	B9G	1
Z309		6.3	0.6†	250	250	−2.0	20.0	5.25	0.5	15.0	13.0	2.5	0.007	B9A	22
Z319	(SE)	6.3	0.3	350	250*	−1.7	15.0	1.2	0.5	19.0	8.0	3.0	0.003	B9A	46
Z759		6.3	0.6	Other data, except base connections, as Type Z359										B9A	48
Z359		12.6	0.3	250	250	−2.0	20.0	5.25	0.05	15.0	13.0	2.5	0.007	B9A	47
W30	(VM)	13.0	0.3	250	250	−1.0	12.0	6.0	1.0	4.0	5.7	10.0	0.002	B7	5
W31	(VM)	13.0	0.3	200	100	−2.0	8.0	5.0	—	2.7	14.0	8.7	0.0026	B7	5
Replacement Types															
Z14		1.4*	0.05	90	90	0	1.2	0.24	1.5	0.75	2.8	10.8	0.007	IO	7
W21	(VM)	2.0*	0.1	120	120	0	3.6	1.2	—	1.4	8.8	6.0	0.0045	B4 / B7	2 / 4
Z21		2.0*	0.1	150	120	0	2.5	0.8	—	1.7	9.7	6.1	0.005	B4	2
Z22		2.0*	0.1	150	120	0	2.5	0.8	—	1.4	9.7	11.0	0.0075	B7	4
MS4B		4.0	1.0	200	80	−1.0	3.4	1.2	0.35	3.2	12.7	5.6	0.002	B5	2
W42	(VM)	4.0	0.6	250	125	−3.0	7.6	1.9	—	1.5	5.1	10.4	0.005	B7	6
EBF80/WD709	(VM, DD)	6.3	0.3	250	85	−2.0	5.0	1.75	1.4	2.2	4.2	4.9	0.0025	B9A	12
EF80/Z719		6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.006	B9A	10
EF85	(VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10
EF86/Z729		6.3	0.2	250	140	−2.0	3.0	0.6	2.5	1.8	4.0	5.5	0.025	B9A	23
EF89	(VM)	6.3	0.2	250	100	−2.0	9.0	3.0	1.0	3.5	5.5	5.1	0.002	B9A	36
EF91/Z77		6.3	0.3	250	250	−2.0	10.0	2.5	7.5	7.4	7.4	3.0	0.009	B7G	21
EF92/W77	(VM)	6.3	0.2	200	200	−2.5	8.0	2.0	0.5	2.5	4.6	6.5	0.009	B7G	21
EF93/W727	(VM)	6.3	0.3	250	100	−1.0	11.0	4.2	1.0	4.4	5.5	5.0	0.0035	B7G	16
KTW61	(VM)	6.3	0.3	250	100	−3.0	8.0	2.7	0.46	2.9	7.8	10.0	0.0025	IO	8
KTW63	(VM)	6.3	0.3	250	100	−3.0	7.6	1.5	—	1.5	4.5	7.5	0.005	IO	9
W61	(VM)	6.3	0.3	250	100	−3.0	10.0	2.3	0.45	2.9	7.8	10.0	0.002	IO	8
W81	(VM)	6.3	0.3	250	100	−3.6	9.6	3.6	—	2.8	7.25	6.0	0.006	B8B	3
Z63		6.3	0.3	250	100	−2.0	1.0	0.25	1.5	1.23	4.7	7.5	0.0038	IO	8
Z66		6.3	0.63	250	250	−1.85	8.0	2.0	1.5	7.5	11.0	5.5	0.006	IO	8
Z749		6.3	0.3	170	170	−1.9	10.0	2.6	—	9.2	8.3	3.3	0.0065	B9A	10
Z329		7.3	0.3	170	170	−1.9	10.0	2.6	—	8.8	9.0	4.4	0.0073	B9A	10
W107	(VM)	12.6	0.1	250	250	−2.5	8.0	2.0	0.5	2.5	4.2	7.0	0.006	B7G	22
W76	(VM)	13.0	0.16	250	100	−3.0	7.6	1.9	0.5	1.5	4.2	12.8	0.007	IO	8
W101	(VM)	19.0	0.1	Other data as Type W81											

(Continued)

Type	Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
G.E.C. *(Continued)*														
Replacement Types (Continued)														
UBF89/WD119 (VM, DD)	19.0	0.1	200	100	−1.5	11.0	3.3	0.6	4.5	5.0	5.2	0.002	B9A	12
Current Types														
DAF96/ZD25 (SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	5
DF91/W17 (VM)	1.4*	0.05	90	67.5	0	3.5	1.4	0.5	0.9	4.5	7.5	0.006	B7G	2
DF96/W25 (VM)	1.4	0.025	85	64	0	1.65	0.55	1.0	0.85	3.3	7.8	0.01	B7G	64
W729 (VM)	6.3	0.3	170	170	−2.5	10.0	2.5	—	6.0	7.5	3.3	0.007	B9A	10
W739 (VM)	6.3	0.2	175	100	−1.3	12.0	3.5	—	4.5	3.3	7.8	0.01	B9A	1
W118 (VM)	13.0	0.1	175	100	−2.5	7.0	2.0	1.0	2.3	5.1	6.8	0.035	B8A	8
W119 (VM)	13.0	0.1	175	100	−1.3	12.0	3.5	—	4.4	5.2	5.0	0.0017	B9A	10

* Screen and secondary-cathode voltage.

HIVAC														
Obsolete Types														
XW0.75A	0.033*	0.25	30	30	0	0.3	0.1	1.0	0.18	—	—	—	B5A	1
XFW20	0.625*	0.0125	22.5	22.5	0	—	—	1.2	—	—	—	—	B5A	2
XFW30	0.625*	0.0125	22.5	22.5	0	—	—	—	—	—	—	—	B5A	1
XFW40	0.625*	0.01	22.5	22.5	0	—	—	—	—	—	—	—	B5A	1
XFW10	0.675*	0.025	22.5	22.5	0	—	—	1.2	—	—	—	—	B5A	1
XW0.75B	0.675*	0.025	30	30	0	0.2	0.01	1.0	0.18	—	—	—	B5A	1
XSG1.5V	1.5*	0.08	50	30	0	0.55	0.25	0.66	0.3	—	—	—	Sm4	2
XW1.5V	1.5*	0.08	50	45	0	0.75	0.2	1.0	0.52	—	—	—	Sm5	1
HP215	2.0*	0.15	150	70	−1.5	1.5	0.3	0.5	1.2	8.4	8.0	0.004	B4 / B7	2 / 4
VP215 (VM)	2.0*	0.15	150	70	0	3.75	0.75	—	1.25	8.4	8.0	0.004	B4 / B7	2 / 4
VP215B, VP215C (VM)	2.0*	0.15	120	120	0	3.25	0.95	1.0	1.2	5.3	8.4	0.003	B7 / B7	13 / 4
XSG2.0V	2.0*	0.08	50	30	0	0.6	0.3	0.5	0.4	—	—	—	Sm4	2
XVS2.0V (VM)	2.0*	0.08	60	30	0	0.4	0.15	0.33	0.33	—	—	—	Sm4	2
XW2.0V	2.0*	0.08	50	45	0	0.95	0.3	1.0	0.6	—	—	—	Sm5	2
ACVPB (VM)	4.0	1.0	250	250	−1.5	12.0	5.0	1.0	4.0	5.3	9.9	0.0025	B7	6
ACVH (VM)	4.0	1.0	200	80	−1.5	9.3	1.6	0.45	3.3	11.5	7.4	0.0015	B5	2
ACVP (VM)	4.0	1.0	200	100	−1.5	5.7	2.3	—	3.0	12.9	9.4	0.003	B5 / B7	2 / 5
VP13 (VM)	13.0	0.3	200	100	−1.5	6.3	2.0	—	3.0	12.6	9.3	0.003	B7	5
Current Types														
XFW50	0.625*	0.0075	22.5	22.5	0	—	—	—	—	—	—	—	B5A	1
XFR1	1.25*	0.1	45	45	0	3.0	0.9		2.0	4.0	4.0	0.01	B5A	2
XFR2	1.35*	0.05	67.5	67.5	0	1.8	0.05	—	1.1	3.7	4.6	0.01	B5A	2
XFR5	1.25*	0.02	67.5	67.5	0	1.8	0.5	—	1.1	3.7	4.6	0.01	B5A	2
XR6	6.3	0.15	100	100	−1.4	7.0	2.2	0.3	5.0	—	—	—	B8D	4
XR7	6.3	0.2	100	100	−2.0	7.5	2.5	0.25	5.5	—	—	—	B8D	5

MARCONI														
Obsolete Types														
Z14	1.4*	0.05	90	90	0	1.2	0.24	1.5	0.75	2.8	10.8	0.007	IO	77
S12	2.0*	0.06	100	30	0	2.5	0.4	0.2	0.7	5.6	3.4	0.3	Sm4	2
S23	2.0*	0.1	150	70	0	2.8	0.7	0.3	1.1	8.3	9.0	0.003	B4	2
S24	2.0*	0.15	150	70	0	3.2	1.0	0.3	1.4	9.3	8.9	0.004	B4	2
VS24 (VM)	2.0*	0.15	150	75	0	4.4	0.2	0.25	1.5	9.2	8.7	0.003	B4	2
VP21 (VM)	2.0*	0.1	150	60	0	2.8	0.7	—	1.1	11.5	9.0	0.03	B7	4
MS4	4.0	1.0	200	70	−1.5	2.4	0.3	—	1.1	9.9	4.8	0.002	B5	2
VMP4G (VM)	4.0	1.0	250	100	−2.0	8.0	5.0	—	2.7	14.0	8.7	0.0025	B7	5
VMS4 (VM)	4.0	1.0	200	80	0	14.0	3.0	—	2.4	11.3	7.7	0.002	B5	2
VMS4B (VM)	4.0	1.0	200	80	0	8.0	1.5	—	2.9	12.0	8.1	0.0024	B5	2
KTW61 (VM)	6.3	0.3	250	100	−3.0	8.0	2.7	0.46	2.9	7.8	10.0	0.0025	IO	8
W81 (VM)	6.3	0.3	250	100	−3.6	9.6	3.6	—	2.8	7.25	6.0	0.006	B8B	3
Z62	6.3	0.45	300	150	−2.0	10.0	2.7	0.75	7.5	10.9	8.0	0.02	IO	8
W30 (VM)	13.0	0.3	250	250	−1.0	12.0	6.0	1.0	4.0	5.7	10.0	0.002	B7	5
W31 (VM)	13.0	0.3	200	100	−2.0	8.0	5.0	—	2.7	14.0	8.7	0.0026	B7	5
W101 (VM)	19.0	0.1	Other data as Type W81											
Replacement Types														
W21Met (VM)	2.0*	0.1	150	120	0	3.6	1.2	—	1.4	8.8	6.0	0.0045	B4	2
Z21Met	2.0*	0.1	150	120	0	2.5	0.8	—	1.7	9.7	6.1	0.005	B4	2
Z22Met	2.0*	0.1	150	120	0	2.5	0.8	—	1.7	9.7	11.0	0.0075	B7	4

(Continued)

Type	Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MARCONI *(Continued)*														
Replacement Types (Continued)														
KTZ41	4.0	1.5	250	250	−1.5	18.0	5.25	—	12.0	14.0	14.5	0.008	B7	30
MS4B	4.0	1.0	250	80	0	3.4	1.2	0.35	3.2	12.7	5.6	0.002	B5	2
MSP4	4.0	1.0	250	100	−1.75	3.4	1.0	—	2.4	17.2	10.0	0.01	B5 / B7	2 / 5
MSP41	4.0	1.0	250	240	−4.0	9.0	3.2	—	3.2	17.2	10.0	0.01	B5 / B7	2 / 5
W42Met (VM)	4.0	0.6	250	100	−3.0	2.0	2.0	—	1.5	5.1	10.4	0.005	B7	6
KTZ63	6.3	0.3	260	100	−3.0	1.0	0.25	1.5	1.23	4.7	7.5	0.0038	IO	8
KTW63 (VM)	6.3	0.3	250	100	−3.0	7.6	1.5	—	1.5	4.5	7.5	0.005	IO	9
W61M (VM)	6.3	0.3	250	80	−3.0	8.0	2.3	1.7	2.9	7.8	10.0	0.002	IO	8
Z63	6.3	0.3	250	100	−3.0	2.0	0.5	1.5	1.25	4.7	7.5	0.0038	IO	8
Z66	6.3	0.63	250	200	−1.85	8.0	2.0	1.5	7.5	11.0	5.5	0.006	IO	8
W76 (VM)	13.0	0.16	175	100	−3.0	8.5	1.7	0.5	1.5	4.2	12.8	0.007	IO	8
Current Types														
DAF91/ZD17 (SD)	1.4*	0.05	90	90	0	2.7	0.63	0.5	0.72	2.2	2.4	0.2	B7G	5
DAF96 (SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.06	—	0.17	1.8	2.7	0.3	B7G	5
DF91/W17 (VM)	1.4*	0.05	90	67.5	0	3.5	1.4	0.5	0.9	4.5	7.5	0.006	B7G	2
DF96	1.4*	0.025	85.0	64.0	0	1.65	0.55	1.0	0.75	3.3	7.8	0.01	B7G	2
6BJ6 (VM)	6.3	0.15	250	100	−1.0	9.2	3.3	1.3	3.8	4.5	5.5	0.0035	B7G	32
EBF80/WD709 (VM, DD)	6.3	0.3	250	85	−2.0	5.0	1.75	1.4	2.2	4.2	4.9	0.0025	B9A	12
EBF89 (VM, DD)	6.3	0.3	250	100	−2.0	9.0	3.0	1.0	3.8	5.0	5.0	0.002	B9A	12
EF22/W143 (VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.2	2.2	5.5	6.4	0.002	B8B	61
EF39/W147 (VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.25	2.2	5.5	7.2	0.003	IO	8
EF41/W150 (VM)	6.3	0.2	250	97	−2.5	6.0	1.7	1.0	2.2	5.0	8.0	0.002	B8A	18
EF42/Z150	6.3	0.33	250	250	−2.0	10.0	2.3	0.44	9.5	9.5	4.5	0.005	B8A	8
EF80/Z152	6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.007	B9A	10
EF80/Z719	6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.007	B9A	10
EF85/W719 (VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10
EF86/Z729	6.3	0.2	250	140	−2.0	3.0	0.6	2.5	2.0	4.0	5.5	0.025	B9A	23
EF89 (VM)	6.3	0.2	250	100	−2.0	9.0	3.0	1.0	3.6	5.5	5.1	0.002	B9A	36
EF91/Z77	6.3	0.3	250	250	−2.0	10.0	2.5	1.0	7.6	7.4	3.0	0.009	B7G	21
W77/9D6 (VM)	6.3	0.2	250	200	−2.5	8.0	2.1	0.5	2.5	4.6	6.5	0.009	B7G	21
W148/7H7 (VM)	6.3	0.3	250	150	−2.4	10.0	3.2	0.8	4.2	8.0	7.0	0.007	B8B	3
W149/7B7 (VM)	6.3	0.15	250	100	−3.0	8.5	1.75	0.75	1.7	5.0	6.0	0.007	B8B	3
W727/6BA6 (VM)	6.3	0.3	250	100	−1.0	11.0	4.2	1.5	4.4	5.5	5.0	0.0035	B7G	16
W729 (VM)	6.3	0.3	170	170	0	11.5	3.8	1.0	3.5	7.5	3.3	0.007	B9A	10
Z319/6351 (SE)	6.3	0.3	350	250*	—	15.5	1.2	0.5	19.0	8.0	3.0	0.003	B9A	46
W107 (VM)	12.6	0.1	200	200	−2.5	8.0	2.0	0.5	2.5	4.2	7.0	0.006	B7G	22
UAF42/WD142 (VM, SD)	12.6	0.1	200	85	−2.0	5.0	1.5	1.0	2.0	4.5	5.1	0.002	B8A	12
UF41/W142 (VM)	12.6	0.1	200	116	−3.0	7.2	2.8	1.0	2.3	5.0	7.0	0.002	B8A	24
UF89 (VM)	12.6	0.1	170	110	−2.0	12.0	3.9	0.53	3.8	5.5	5.1	0.002	B9A	36
W145 (VM)	13.0	0.1	175	100	−2.5	7.0	2.0	—	2.3	5.1	6.8	0.0035	B8A	8
UF42/Z142	21.0	0.1	170	170	−2.0	10.6	2.8	0.2	8.5	9.5	4.5	0.005	B8A	8
Z145	22.0	0.1	200	200	−1.8	10.0	2.6	—	9.0	9.0	4.6	0.0065	B8A	17

* Screen and secondary-cathode voltage.

MULLARD														
Obsolete Types														
DF70	0.625*	0.025	30	30	0	0.375	0.125	0.5	0.22	1.6	2.4	0.5	B8D‡	6
DAF70 (SD)	1.25*	0.025	67.5	67.5	0	1.0	0.25	0.4	0.44	1.8	3.0	0.15	B8D‡	1
DF72	1.25*	0.025	67.5	67.5	0	1.7	0.5	0.75	1.0	3.2	5.1	0.01	B8D‡	2
DF1 (VM)	1.4*	0.05	90	90	0	1.2	0.3	1.5	0.75	—	—	—	Ct8	26
KF35 (VM)	2.0*	0.05	120	60	−1.5	1.45	0.5	1.5	1.08	8.0	10.0	0.01	IO	85
PM12M (VM)	2.0*	0.18	150	90	0	2.5	0.5	—	1.4	—	—	—	B4	2
SP2	2.0*	0.18	135	135	0	3.0	1.0	0.7	1.8	11.0	6.0	0.01	B7	4
VP2 (VM)	2.0*	0.18	135	135	0	3.0	1.25	0.04	1.5	10.7	6.3	0.007	B7	4
VP2B (VM, H_x)	2.0*	0.135	135	60	−1.5	2.0	0.95	1.3	1.4	7.9	16.3	0.002	B7	28
SP4	4.0	1.0	200	100	−2.0	3.0	1.1	2.2	2.3	—	—	—	B7	5
SP4B	4.0	0.65	250	250	−2.4	4.0	1.5	2.0	3.4	6.9	8.1	0.003	B7	6
TSP4	4.0	1.3	200	100	−2.5	8.0	1.5	—	4.7	9.6	7.5	0.01	B7	6
VP4 (VM)	4.0	1.0	200	100	−2.0	4.5	1.9	1.0	2.3	12.4	10.0	0.005	B5 / B7	2 / 6
VP4A (VM)	4.0	1.2	200	100	−2.0	4.25	1.8	1.4	2.5	12.5	10.2	0.006	B5 / B7	2 / 6
EAF41 (VM, SD)	6.3	0.2	250	110	−2.0	5.0	1.5	1.4	2.0	4.0	6.5	0.002	B8A	11
EF8, EF38 (VM)	6.3	0.2	250	250	−2.5	8.0	0.2	0.45	1.8	4.9	7.8	0.007	Ct8 / IO	11 / 66
EF36	6.3	0.2	250	100	−2.0	3.0	0.8	2.5	1.8	5.5	8.5	0.02	IO	8
EF37	6.3	0.2	250	100	−2.0	3.0	0.8	2.5	1.8	5.5	8.5	0.02	IO	8

‡ Flying Leads

(Continued)

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MULLARD *(Continued)*															
Obsolete Types (Continued)															
78	(VM)	6.3	0.3	Other data as Type 6K7										UX6	2
UAF41	(VM, SD)	12.6	0.1	200	85	−2.0	5.0	1.5	1.0	2.0	4.5	5.0	0.002	B8A	11
SP13		13.0	0.2	200	100	−2.0	3.3	1.2	1.3	2.2	7.1	7.7	0.003	Ct8	15
SP13C		13.0	0.2	200	200	−2.2	2.5	0.9	2.5	2.8	6.9	8.1	0.003	B7	6
VP13A	(VM)	13.0	0.2	200	100	−2.0	4.0	1.4	1.0	2.2	—	—	—	Ct8	15
VP13C	(VM)	13.0	0.2	200	200	−2.0	9.0	3.6	—	2.2	8.0	6.1	0.0023	B7	6
Replacement Types															
DF64		0.62*	0.01	15	15	−0.75	0.05	0.017	1.2	0.09	1.8	2.0	0.2	B5A	3
DF66		0.625*	0.015	22.5	22.5	−1.05	0.05	0.015	2.0	0.1	1.6	2.2	0.15	B5A	1
DF73	(VM)	1.25*	0.025	67.5	67.5	0	1.7	0.5	0.8	0.8	2.9	5.0	0.015	B8D‡	2
1N5	(VM)	1.4*	0.05	90	90	0	1.2	0.3	1.5	0.75	3.0	10.0	0.007	IO	77
DAF91	(SD)	1.4*	0.05	90	90	0	2.7	0.63	0.5	0.72	2.0	2.8	0.4	B7G	5
DAF96	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	5
DF33	(VM)	1.4*	0.05	90	90	0	1.2	0.3	1.5	0.75	3.8	9.5	0.007	IO	77
DF91	(VM)	1.4*	0.05	90	67.5	0	3.5	1.4	0.5	0.9	3.6	7.5	0.01	B7G	2
DF92		1.4*	0.05	90	67.5	0	3.7	1.4	0.5	1.0	3.6	7.5	0.01	B7G	2
DF96		1.4*	0.025	85	64	0	1.65	0.55	1.0	0.85	3.3	7.9	0.01	B7G	2
DF97		1.4*	0.025	85	62	0	1.7	0.7	0.45	0.94	3.7	7.5	0.01	B7G	59
VP4B	(VM)	4.0	0.65	250	250	−3.0	11.5	4.25	—	2.0	8.0	5.4	0.002	B7	6
6J7		6.3	0.3	250	100	−3.0	2.0	0.5	1.5	1.25	4.6	12.0	0.007	IO	8
6K7	(VM)	6.3	0.3	250	125	−3.0	10.5	2.6	0.6	1.65	4.6	12.0	0.005	IO	8
6SK7	(VM)	6.3	0.3	250	100	−3.0	9.2	2.6	0.8	2.0	6.5	7.5	0.005	IO	10
EAF42	(VM, SD)	6.3	0.2	250	85	−2.0	5.0	1.5	1.4	2.0	4.5	5.1	0.002	B8A	12
EBF80	(VM, DD)	6.3	0.3	250	85	−2.0	5.0	1.75	1.4	2.2	4.2	4.9	0.0025	B9A	12
EF9	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.25	2.2	5.5	7.2	0.002	Ct8	15
EF22	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.2	2.0	5.5	6.4	0.002	B8B	3
EF37A		6.3	0.2	250	100	−2.0	3.0	0.8	2.5	1.8	5.5	8.5	0.02	IO	8
EF39	(VM)	6.3	0.2	250	150	−2.5	6.0	1.7	1.25	2.2	5.5	7.2	0.003	IO	8
EF40		6.3	0.2	250	140	−2.0	3.0	0.55	2.5	1.85	4.0	5.5	0.025	B8A	15
EF41	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.0	2.2	4.7	8.0	0.002	B8A	7
EF42		6.3	0.33	250	250	−2.0	10.0	2.3	0.44	9.5	9.5	4.5	0.005	B8A	8
EF50		6.3	0.3	250	250	−2.0	10.0	3.0	1.0	6.5	8.3	5.2	0.007	B9G	1
EF54		6.3	0.3	250	250	−1.7	10.0	1.45	0.5	7.7	6.2	4.9	0.02	B9G	2
EF55		6.3	1.0	250	250	−4.5	40.0	5.5	0.055	12.5	15.0	12.0	0.15	B9G	1
EF70		6.3	0.2	100	100	−2.0	3.0	2.25	0.1	2.5	4.5	4.7	0.025	B8D‡	3
EF71	(VM)	6.3	0.15	100	100	−1.2	7.2	2.2	0.26	4.5	4.4	4.0	0.015	B8D‡	4
EF72		6.3	0.15	100	100	−1.4	7.0	2.2	0.25	5.0	4.1	2.0	0.02	B8D‡	4
EF73		6.3	0.2	100	100	−2.0	7.5	2.5	0.25	5.25	5.0	3.0	0.2	B8D‡	5
EF74		6.3	0.2	100	100	−1.4	7.0	2.4	0.2	3.1	3.6	4.2	50.3	B8D‡	5
12J7		12.6	0.15	Other data as Type 6J7											
12K7	(VM)	12.6	0.15	Other data as Type 6K7											
12SK7	(VM)	12.6	0.15	Other data as Type 6SK7											
UAF42	(VM, SD)	12.6	0.1	200	85	−2.0	5.0	1.5	1.0	2.0	4.5	5.1	0.002	B8A	12
UF41	(VM)	12.6	0.1	170	100	−2.5	6.0	1.75	1.0	2.3	5.0	7.0	0.002	B8A	7
UBF80	(VM, DD)	17.0	0.1	170	85	−2.0	5.0	1.75	0.9	2.2	4.2	4.9	0.0025	B9A	12
UF85		19.0	0.1	200	116	−2.3	11.4	3.1	0.35	6.1	6.9	3.2	0.007	B9A	10
UF42		21.0	0.1	170	170	−2.0	10.0	2.8	0.2	8.5	9.5	4.5	0.005	B8A	8
Current Types															
DF61		1.25*	0.025	67.5	67.5	0	1.7	0.45	1.6	0.95	3.1	3.6	0.01	B5A	3
DF62		1.25*	0.1	45	45	0	3.0	0.8	0.05	2.0	4.0	4.0	0.01	B5A	2
6AS6		6.3	0.175	130	120	−2.0	5.2	3.5	0.11	3.2	4.0	3.0	0.02	B7G	32
E180F		6.3	0.3	190	160	−1.0	13.0	3.5	0.035	16.5	7.9	2.9	0.02	B9A	45
EBF83	(DD)	6.3	0.3	12.6	12.6	††	0.45	0.14	1.0	1.0	5.0	5.2	<0.0025	B9A	12
EBF89	(VM, DD)	6.3	0.3	250	100	−2.0	9.0	2.7	1.0	3.8	5.0	5.2	0.002	B9A	12
EF80		6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.007	B9A	10
EF85	(VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10
EF86		6.3	0.2	250	140	−2.0	3.0	0.6	2.5	2.0	3.8	5.4	0.025	B9A	23
EF89	(VM)	6.3	0.2	250	100	−2.0	9.0	3.0	1.0	3.5	5.5	5.1	0.002	B9A	36
EF91 M8083 (SQ)		6.3	0.3	250	250	−2.0	10.0	2.5	1.0	7.6	7.0	2.0	0.008	B7G	21
EF92 M8161 (SQ)	(VM)	6.3	0.2	250	150	−0.65	8.0	2.0	0.5	2.5	4.5	7.0	0.004	B7G	21
EF93 M8101 (SQ)	(VM)	6.3	0.3	250	100	−1.0	11.0	4.2	1.5	4.4	5.5	5.0	0.0035	B7G	16
EF95 M8100 (SQ)		6.3	0.175	180	120	−2.0	7.7	2.4	0.69	5.1	4.0	2.8	0.02	B7G	14
EF97	(VM)	6.3	0.3	12.6	6.3	—	3.0	1.1	0.15	1.9	6.5	4.0	0.015	B7G	68
EF98		6.3	0.3	12.6	6.3	†	2.0	0.7	0.02	2.0	6.7	4.0	0.015	B7G	68
EF183	(VM)	6.3	0.3	200	90	−2.0	12.0	4.5	0.5	12.5	9.5	3.0	<0.0055	B9A	10
EF184		6.3	0.3	170	170	−2.0	10.0	4.1	0.33	15.6	10.0	3.0	<0.005	B9A	10

‡ Flying Leads

(Continued)

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MULLARD *(Continued)*															
Current Types (Continued)															
EF730 5636 (SQ)		6.3	0.15	100	100	−1.0	5.3	4.1	0.11	3.2	4.0	3.4	<0.02	B8D‡	8
EF731 5899 (SQ)	(VM)	6.3	0.15	100	100	−1.0	7.2	2.0	0.26	4.5	4.3	3.4	<0.015	B8D‡	14
EF732 5840 (SQ)		6.3	0.15	100	100	−1.0	7.5	2.4	0.26	5.0	4.2	3.4	<0.015	B8D‡	14
HF93	(VM)	12.6	0.15	Other data as Type EF93											
UF86		12.6	0.1	Other data as Type EF86											
UF89	(VM)	12.6	0.1	170	110	−2.0	12.0	3.9	0.525	3.8	5.5	5.1	0.002	B9A	36
UBF89	(VM, DD)	19.0	0.1	200	100	−1.5	11.0	3.3	0.6	4.5	5.0	5.2	<0.0025	B9A	12
UF80		19.0	0.1	170	170	−2.0	10	2.5	0.4	7.4	7.5	<0.01	<0.0007	B9A	10

† Grid current biasing Rg_1 = 10MΩ †† Grid current biasing Rg_1=2.2MΩ ‡ Flying Leads.

S.T.C.															
Current Types															
5A/162D		5.5	0.26	40	40	−1.5	3.0	0.77	0.2	4.5	8.0	5.5	0.02	IO	8
5A/152M/G		6.3	0.46	250	150	−2.1	10.0	2.0	—	7.5	10.0	5.0	0.018	B8B	3
5A/163K		6.3	0.45	200	200	−1.5	15.0	5.0	—	15.0	13.0	3.6	0.016	B9A	60
5A/170K		6.3	0.3	180	150	−1.0	13.0	3.0	—	16.5	7.9	2.9	0.03	B9A	45
5A/180M		6.3	0.45	180	150	−1.0	26.0	6.0	—	32.0	16.0	5.0	0.05	B8B	19
5B/110M		6.3	0.8	250	150	−6.0	38.0	8.0	—	6.5	11.0	6.0	0.035	B8B	3
5A/102D		7.5	0.85	180	150	−18.0	43.0	7.0	—	2.5	8.5	12.8	1.1	IO	8
TUNGSRAM															
Obsolete Types															
HP210		2.0*	0.12	150	150	−1.5	1.9	0.7	2.5	1.9	9.0	8.5	0.003	B4 B7	2 4
HP211	(VM)	2.0*	0.12	150	150	−0.9	2.6	0.6	2.0	1.7	—	—	0.003	B4 B7	2 4
SE211	(VM)	2.0*	0.12	150	75	−0.9	1.0	0.1	1.5	1.5	—	—	0.003	B4	2
SP2B SP2BS		2.0*	0.05	135	135	−0.5	2.6	1.0	1.0	0.8	5.3	5.0	0.006	B7 Ct8	13 25
SP2D		2.0*	0.12	150	150	−0.1	1.45	0.35	2.0	1.7	—	—	0.005	B7	13
SS210		2.0*	0.12	150	75	−1.0	0.6	0.1	1.0	1.4	9.0	8.5	0.003	B4	2
VP2B VP2BS	(VM)	2.0*	0.06	135	135	−0.5	2.5	0.8	2.0	0.65	5.7	5.1	0.006	B7 Ct8	13 25
VP2D	(VM)	2.0*	0.12	150	75	−1.5	1.3	0.6	0.9	2.0	—	—	0.005	B7	13
AS4120		4.0	1.0	200	100	−2.0	3.0	0.8	0.6	3.0	11.5	7.5	0.003	B5	2
AS4125	(VM)	4.0	1.2	200	100	−2.0	3.0	0.8	0.25	3.0	8.0	12.0	0.005	B5	2
HP4101		4.0	1.0	200	100	−2.0	3.5	0.6	2.0	3.5	10.0	12.0	0.002	B5 B7	2 5
HP4106	(VM)	4.0	1.0	200	100	−2.0	5.0	1.25	1.2	3.5	—	—	0.002	B5 B7	2 5
HP4115	(VM)	4.0	1.02	200	100	−2.0	4.3	1.5	1.4	3.2	—	—	0.002	B5 B7	2 5
SP4 SP4S		4.0	0.65	250	100	−2.0	3.0	1.5	1.5	3.5	6.4	7.6	0.003	B7 Ct8	6 15
SP4B		4.0	0.65	250	250	−2.0	2.9	0.8	2.0	4.0	6.4	7.6	0.003	B7	6
VP4 VP4S	(VM)	4.0	0.65	250	100	−3.0	8.0	2.5	1.2	1.8	6.1	7.8	0.003	B7 Ct8	6 15
6C6		6.3	0.3	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	UX6	2
6D6	(VM)	6.3	0.3	250	100	−3.0	8.2	2.0	0.8	1.6	4.7	6.5	0.007	UX6	2
EBF2	(VM, DD)	6.3	0.2	250	250	−2.0	5.0	2.0	2.0	1.8	4.3	8.2	0.002	Ct8	13
EF5	(VM)	6.3	0.2	250	100	−3.0	8.0	2.5	1.2	1.7	5.4	6.9	0.003	Ct8	15
EF6		6.3	0.2	250	100	−2.0	3.0	1.0	1.75	2.0	5.4	6.9	0.003	Ct8	15
EF8	(VM)	6.3	0.2	250	250	−2.5	8.0	0.25	2.0	1.8	4.9	7.8	0.007	Ct8	11
EF9	(VM)	6.3	0.2	250	250	−2.5	6.0	1.7	1.5	2.2	5.0	7.0	0.003	Ct8	15
HP13 HP13S	(VM)	13.0	0.2	250	100	−1.0	8.0	2.9	1.0	3.5	—	—	—	B7 Ct8	6 15
SP13 SP13S		13.0	0.2	250	100	−2.0	3.0	1.5	2.0	2.4	6.4	7.6	0.003	B7 Ct8	6 1
SP13B		13.0	0.2	250	250	−1.5	3.5	1.5	1.5	3.5	6.4	7.6	0.003	B7	6
VP13 VP13S	(VM)	13.0	0.2	200	100	−3.0	8.0	2.6	1.0	2.8	6.4	7.6	0.003	B7 Ct8	6 15
VP13B	(VM)	13.0	0.2	250	200	−1.0	10.0	3.5	2.0	3.5	6.4	7.6	0.003	B7	6
S2018		20.0	0.18	200	60	−3.0	4.0	1.2	0.3	1.2	—	—	—	B7 B5	5 2

(Continued)

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
TUNGSRAM (*Continued*)															
Obsolete Types (Continued)															
HP2018		20.0	0.18	200	100	−2.0	4.0	1.2	1.0	3.5	—	—	—	B5	2
HP2118	(VM)	20.0	0.18	200	100	−2.0	5.0	1.1	1.0	3.5	—	—	—	B5 / B7	2 / 5
SS2018		20.0	0.18	200	100	−3.0	3.0	1.0	0.5	3.0	—	—	—	B5	2
Replacement Types															
VP4B	(VM)	4.0	0.65	250	250	−1.0	10.0	2.5	1.0	4.0	6.4	7.6	0.003	B7	6
6B7 / 6B8	(DD)	6.3	0.3	250	125	−3.0	10.0	2.3	0.6	1.33	3.5	9.5	0.007	UX7 / IO	2 / 15
VP13K	(VM)	13.0	0.2	200	100	−3.0	8.0	2.6	0.9	2.0	6.4	7.6	0.003	B7	6
Current Types															
1AH5	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	1.8	2.7	0.3	B7G	5
1AJ4		1.4*	0.025	85	64	0	1.65	0.55	1.0	0.75	3.3	7.8	0.01	B7G	2
1L4		1.4*	0.05	90	67.5	0	3.7	1.4	0.5	1.0	3.6	7.5	0.01	B7G	2
1N5GT	(VM)	1.4*	0.05	90	90	0	1.2	0.3	1.5	0.75	3.8	9.5	0.007	IO	77
1S5	(SD)	1.4*	0.05	67.5	67.5	0	1.6	0.4	0.6	0.63	2.2	2.4	0.2	B7G	5
1T4	(VM)	1.4*	0.05	90	67.5	0	3.5	1.5	0.5	0.9	3.6	7.5	0.01	B7G	2
6AC7		6.3	0.45	300	150	−2.0	10.0	2.5	1.0	9.0	11.0	5.0	0.015	IO	10
6AK5		6.3	0.175	180	120	−2.0	7.7	2.4	0.69	5.1	4.0	2.8	0.02	B7G	14
6AM6 / EF91		6.3	0.3	250	250	−2.0	10.0	2.1	1.0	7.5	3.25	7.6	0.0054	B7G	21
6AU6		6.3	0.3	250	150	−1.0	10.8	4.3	1.0	5.2	5.5	5.0	0.0035	B7G	16
6BA6		6.3	0.3	250	100	−1.0	11.0	4.2	1.0	4.4	5.5	5.0	0.0035	B7G	16
6BX6		6.3	0.3	170	170	−2.0	10.0	2.5	0.4	7.4	7.5	3.3	0.007	B9A	10
6BY7	(VM)	6.3	0.3	250	100	−2.0	10.0	2.5	0.5	6.0	7.2	3.7	0.007	B9A	10
6CJ5	(VM)	6.3	0.2	250	100	−2.5	6.0	1.7	1.0	2.2	4.7	8.0	0.002	B8A	7
6CT7	(VM, SD)	6.3	0.2	250	85	−2.0	5.0	1.5	1.4	2.0	4.5	5.1	0.002	B8A	12
6CQ6	(VM)	6.3	0.2	250	150	−0.65	8.0	2.0	0.5	2.5	4.5	7.0	0.004	B7G	21
6EH7	(VM)	6.3	0.3	200	90	−2.0	12.0	4.5	0.5	13.0	9.0	3.0	<0.005	B9A	10
6J7		6.3	0.3	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	IO	8
6N8	(VM, DD)	6.3	0.3	250	85	−2.0	5.0	1.75	1.4	2.2	4.2	4.9	0.0025	B9A	12
6SJ7		6.3	0.3	250	100	−3.0	3.0	0.8	1.0	1.65	6.0	7.0	0.005	IO	10
6SK7	(VM)	6.3	0.3	250	100	−3.0	9.2	2.6	0.8	2.0	6.5	7.5	0.005	IO	10
77		6.3	0.3	250	100	−3.0	2.3	0.5	1.0	1.25	4.7	11.0	0.007	UX6	2
78	(VM)	6.3	0.3	250	125	−3.0	10.5	2.6	0.6	1.65	4.5	11.0	0.007	UX6	2
6267		6.3	0.2	250	140	−2.0	3.0	0.6	2.5	1.8	4.0	5.5	0.025	B9A	23
EF37A		6.3	0.2	250	100	−2.0	3.0	0.8	2.5	1.8	5.5	8.5	0.02	IO	8
EF39	(VM)	6.3	0.2	250	250	−2.5	6.0	1.7	1.5	2.2	5.0	7.0	0.003	IO	8
EF50		6.3	0.3	250	250	−2.0	10.0	3.0	1.0	6.5	8.3	5.2	0.007	B9G	1
EF89	(VM)	6.3	0.2	250	100	−2.0	9.0	3.0	1.0	3.6	5.5	5.1	0.002	B9A	36
EF98		6.3	0.3	12.6	12.6	−1.0†	4.8	2.2	0.05	3.0	—	—	—	B7G	68
12AC5	(VM)	12.6	0.1	170	100	−2.5	6.0	1.75	1.0	2.2	5.0	7.0	0.002	B8A	7
12BA6		12.6	0.15			Other data as Type 6BA6									
12J7		12.6	0.15	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	IO	8
12K7	(VM)	12.6	0.15	250	125	−3.0	10.5	2.6	0.6	1.65	4.5	11.0	0.007	IO	8
12S7	(VM, SD)	12.6	0.1	200	85	−2.0	5.0	1.5	1.0	2.0	4.5	5.1	0.002	B8A	12
12SJ7		12.6	0.15			Other data as Type 6SJ7									
12SK7		12.6	0.15			Other data as Type 6SK7									
UF89	(VM)	12.6	0.1	170	110	−2.0	12.0	3.9	0.525	3.85	5.5	5.1	0.002	B9A	36
UBF80	(VM, DD)	17.0	0.1	170	85	−2.0	5.0	1.75	0.9	2.2	4.2	4.9	0.0025	B9A	12
UF85		19.0	0.1	200	116	−2.3	11.4	3.1	0.35	6.1	6.9	3.2	0.007	B9A	10

† Grid current biasing Rg_1=10MΩ.

AMERICAN															
Current Types															
1AB5		1.2*	0.05	90	90	0	3.5	0.8	0.27	1.1	2.8	4.2	0.25	B8B	39
1AD4		1.25*	0.1	45.0	45.0	0	3.0	0.8	0.5	2.0	—	—	—	Wires	
1AD5		1.25*	0.04	67.5	67.5	0	1.85	0.75	0.7	0.74	1.8	2.8	0.01	Wires	
1T6	(SD)	1.25*	0.04	67.5	67.5	0	1.6	0.4	0.4	0.6	—	—	—	Wires	
1W5		1.25*	0.04	67.5	67.5	0	1.85	0.75	0.7	0.74	2.3	3.5	0.01	Wires	
2E31		1.25*	0.05	22.5	22.5	0	0.4	0.3	—	0.5	—	—	—	Wires	
2E32		1.25*	0.05	22.5	22.5	0	0.4	0.3	0.35	0.5	—	—	—	Wires	
2E41	(SD)	1.25*	0.03	22.5	22.5	0	0.35	0.12	—	—	—	—	—	Wires	
2E42	(SD)	1.25*	0.03	22.5	22.5	0	0.35	0.12	0.25	0.37	—	—	—	Wires	
1A8	(SD, TP)	1.4*	0.1†	90	90	0	1.2	0.3	0.6	0.75	3.0	10.0	0.012	IO	94
1LC5	(VM)	1.4*	0.05	90	45	0	1.15	0.2	1.5	0.78	3.2	7.0	0.007	B8B	28
1LD5	(SD)	1.4*	0.05	90	45	0	0.6	0.1	0.95	0.6	3.2	6.0	0.18	B8B	31
1LG5		1.4*	0.05	90	45	0	1.7	0.4	1.0	0.8	—	—	—	B8B	33
1LN5		1.4*	0.05	90	90	0	1.6	0.35	1.1	0.8	3.4	0.8	0.007	B8B	28

(*Continued*)

Type		Heater		Volts			Current (mA)		r_a (MΩ)	g_m (mA/V)	Capacitances (pF)			Base	
		Volts	Amps	Anode	Screen	Grid	Anode	Screen			c_{gk}	c_{ak}	c_{ga}	Type	Ref.
AMERICAN (*Continued*)															
Current Types (*Continued*)															
1P5	(VM)	1.4*	0.05	90	90	0	2.3	0.7	0.8	0.75	3.0	10.0	0.007	IO	77
1SA6		1.4*	0.05	90	67.5	0	2.45	0.68	0.8	0.97	5.2	8.6	0.01	IO	89
1U4		1.4*	0.05	90	90	0	1.6	0.45	1.5	0.9	3.6	7.5	0.008	B7G	2
3D6		1.4*	0.22†	135	90	−6.0	5.7	0.7	—	2.2	7.5	6.5	0.3	B8B	32
3E6		1.4*	0.1†	90	90	0	3.8	1.3	0.3	2.1	5.5	7.5	0.007	B8B	44
3SB6		1.4*	0.05	90	67.5	0	1.45	0.38	0.7	0.67	3.2	3.0	0.25	IO	78
1A4	(VM)	2.0*	0.06	180	67.5	−3.0	2.3	0.8	1.0	0.75	5.0	11.0	0.007	UX4	2
1B4 / 1E5		2.0*	0.06	180	67.5	−3.0	1.7	0.6	1.5	0.65	5.0	11.0	0.007	UX4 / IO	2 / 77
1F6 / 1F7	(DD)	2.0*	0.06	180	67.5	−1.5	2.2	0.7	1.0	0.65	4.0	9.0	0.007	UX6 / IO	10 / 79
2B7	(DD)	2.5	0.8	250	125	−3.0	9.0	2.3	0.65	1.1	3.5	9.5	0.007	UX7	2
6AB7		6.3	0.45	300	200	−3.0	12.5	3.2	0.7	5.0	8.0	5.0	0.015	IO	10
6AC7		6.3	0.45	300	150	−2.0	10.0	2.5	1.0	9.0	11.0	5.0	0.015	IO	10
6AG5		6.3	0.3	250	150	−1.8	7.0	2.0	0.8	5.0	6.5	1.8	0.025	B7G	14
6AJ5		6.3	0.175	180	75	−7.5	2.9	1.5	—	2.75	4.1	2.0	0.02	B7G	14
6AJ7		6.3	0.45	300	300	−2.0	10.0	2.5	1.0	9.0	11.0	5.0	0.015	IO	10
6AK7		6.3	0.65	300	150	−3.0	30.0	7.0	0.13	11.0	13.0	7.5	0.06	IO	11
6AS6		6.3	0.175	120	120	−2.0	5.5	3.5	—	3.5	4.0	3.0	0.02	B7G	32
6BD6		6.3	0.3	250	100	−3.0	9.0	3.5	0.7	2.0	4.3	5.0	0.004	B7G	16
6CB6		6.3	0.3	200	150	—	9.5	2.8	0.6	6.2	6.3	1.9	0.02	B7G	32
6D7		6.3	0.3	250	100	−3.0	2.0	0.5	1.0	1.23	7.0	12.0	0.005	UX7	11
6E7	(VM)	6.3	0.3	250	100	−3.0	8.2	2.0	0.8	1.6	4.7	6.5	0.007	UX7	11
6EH6		6.3	0.15	250	150	−1.0	7.4	2.9	1.4	4.6	5.4	4.4	0.004	B7G	32
6H8	(DD)	6.3	0.3	250	100	−2.0	8.5	—	0.65	2.4	—	—	—	IO	15
6M7		6.3	0.3	250	125	−2.5	10.5	2.8	0.9	3.4	—	—	—	IO	8
6M8	(SD, TP)	6.3	0.6	100	100	−3.0	8.5	—	0.2	1.9	—	—	—	IO	17
6R6		6.3	0.3	250	100	−3.0	7.0	1.7	—	1.45	—	—	—	IO	12
6S6	(VM)	6.3	0.45	250	100	−2.0	13.0	3.0	0.35	4.0	—	—	—	IO	13
6S7	(VM)	6.3	0.15	250	100	−3.0	8.5	2.0	1.0	1.75	4.4	8.0	0.008	IO	8
6SD7	(VM)	6.3	0.3	250	100	−2.0	6.0	1.9	1.0	3.6	9.0	7.5	0.0035	IO	10
6SE7		6.3	0.3	250	100	−1.5	4.5	1.5	1.1	3.4	8.0	7.5	0.005	IO	10
6SF7	(SD, VM)	6.3	0.3	250	100	−1.0	12.4	3.3	0.7	2.05	5.5	6.0	0.004	IO	71
6SH7		6.3	0.3	250	150	−1.5	10.8	4.1	0.9	4.9	8.5	7.0	0.003	IO	14
6SV7	(SD)	6.3	0.3	250	150	−1.0	7.5	2.8	0.8	3.4	6.5	6.0	0.004	IO	71
6T6		6.3	0.45	250	100	−1.0	10.0	2.0	1.0	5.5	—	—	—	IO	9
6W7		6.3	0.15	250	100	−3.0	2.0	0.5	1.5	1.23	5.0	8.5	0.007	IO	8
7A7	(VM)	6.3	0.3	250	100	−3.0	8.6	2.0	0.8	2.0	6.0	7.0	0.005	B8B	3
7AB7		6.3	0.15	250	100	−2.0	1.75	0.6	0.8	1.2	3.5	4.0	0.06	B8B	46
7AC7		6.3	0.45	300	105	—	10.0	2.5	0.5	9.0	10.0	2.0	0.03	B7G	16
7AD7		6.3	0.6	300	150	—	28.0	7.0	0.3	9.5	11.5	7.5	0.03	B8B	3
7AG7		6.3	0.15	250	250	−2.0	6.0	2.0	0.75	4.2	—	—	—	B8B	3
7AH7		6.3	0.15	250	250	—	6.8	1.9	1.0	3.3	7.0	6.5	0.005	B8B	3
7C7		6.3	0.15	250	100	−3.0	2.0	0.5	2.0	1.3	5.5	6.5	0.007	B8B	3
7E7	(DD, VM)	6.3	0.3	250	100	−3.0	7.5	1.6	0.7	1.3	4.6	4.6	0.005	B8B	13
7G7		6.3	0.45	250	100	−2.0	6.0	2.0	0.8	4.5	9.0	7.0	0.007	B8B	3
7G8	(DTT)	6.3	0.3	250	100	−2.5	4.5	0.8	0.23	2.1	4.4	2.6	0.15	B8B	18
7L7		6.3	0.3	250	100	−1.5	4.5	1.5	0.1	3.1	8.0	6.5	0.001	B8B	3
7T7		6.3	0.3	250	150	−1.0	10.8	4.1	0.9	4.9	8.0	7.0	0.005	B8B	3
7V7		6.3	0.45	300	150	−2.5	9.6	3.9	0.3	5.8	9.5	6.5	0.004	B8B	3
7W7	(VM)	6.3	0.45	300	150	−2.2	10.0	3.9	0.3	5.8	9.5	7.0	0.0025	B8B	19
12AW6		12.6	0.15			Other data as Type 6AG5									
12AW7		12.6	0.15	250	150	−1.8	7.0	2.0	0.8	5.0	6.5	1.5	0.025	B7G	32
12B7 / 14A7	(VM)	12.6	0.15	250	100	−3.0	9.2	2.6	0.8	2.0	6.0	7.0	0.005	B8B	3
12B8	(TP, VM)	12.6	0.3	90	90	−3.0	7.0	2.0	0.2	1.8	5.2	9.6	0.015	IO	16
12BD6		12.6	0.15			Other data as Type 6BD6									
12SF7	(SD, VM)	12.6	0.15			Other data as Type 6SF7									
12SH7		12.6	0.15			Other data as Type 6SH7									
14C7		12.6	0.15	250	100	−3.0	2.2	0.7	1.0	1.58	6.0	6.5	0.007	B8B	3
14E7	(DD)	12.6	0.15			Other data as Type 7E7									
14V7		12.6	0.22	300	150	−2.0	9.6	3.9	0.3	5.8	—	—	—	B8B	3
14W7		12.6	0.22	300	150	−2.2	10.0	3.9	0.3	5.8	9.5	7.0	0.0025	B8B	19
25B8	(TP, VM)	25.0	0.15	100	100	−3.0	7.6	2.0	0.19	2.0	5.5	10.0	0.02	IO	16
25D8	(SD, TP)	25.0	0.15	100	100	−3.0	8.5	2.7	0.2	1.9	—	—	—	IO	17
26A6		26.5	0.07	250	100	−1.8	10.5	4.0	1.0	4.0	5.9	5.0	0.0035	B7G	16

OUTPUT VALVES 1

(Triodes, tetrodes and pentodes, Class-A operation)

Type	Heater		Volts			Current (mA)		r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen							Type	Ref.
BRIMAR															
Obsolete Types															
1A5 (P)	1.4*	0.05	90	90	−4.5	4.0	0.8	300,000	0.85	—	25,000	0.115	7	IO	78
1C5 (P)	1.4	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.575	—	8,000	0.27	12	IO	78
1S4 (BT)	1.4*	0.1	90	67.5	−7.0	7.4	1.4	100,000	1.575	—	8,000	0.27	12	B7G	4
3D6 (BT)	1.4*	0.22†	135	90	−4.5	9.8	1.2	150,000	2.4	—	12,000	0.5	—	B8B	32
3Q4 (BT)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	6
3Q5 (BT)	1.4*	0.1†	90	90	−9.0	6.0	1.4	—	1.55	—	8,000	0.24	—	IO	87
3S4 (BT)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.58	—	8,000	0.27	12	B7G	6
2A3 (T)	2.5*	2.5	250	—	−45.0	60.0	—	800	5.2	750	2,500	3.5	5	UX4	1
45 (T)	2.5*	1.5	250	—	−50.0	36.0	—	1,600	2.2	1,500	3,900	1.6	—	UX4	1
47/47E	2.5*	1.75	250	250	−16.5	31.0	6.0	60,000	2.5	450	7,000	2.7	—	UX5	3
7A2 (P)	4.0	1.2	250	250	−16.5	34.0	6.5	80,000	2.35	410	7,000	3.5	10	B5 / B7	7 / 24
7A3 (P)	4.0	2.0	250	250	−6.0	32.0	6.0	60,000	10.0	150	8,500	3.75	10	B7	24
PA1 (T)	4.0	1.0	200	—	−10.0	40.0	—	2,000	5.0	250	4,000	1.8	10	B5	1
PenA1 (P)	4.0*	1.0	250	250	−16.5	32.0	6.5	60,000	3.0	450	8,000	2.7	6	B5	6
6AG6 (P)	6.3	1.2	250	250	−6.0	32.0	6.0	60,000	10.0	150	8,500	3.75	10	IO	36
6B4 (T)	6.3*	1.0	250	—	−45.0	60.0	—	800	5.25	750	2,500	3.5	5	IO	81
6F6 (P)	6.3	0.7	285	285	−20.0	38.0	7.0	78,000	2.55	440	7,000	4.5	9	IO	36
6K6 (P)	6.3	0.4	315	285	−21.0	25.5	4.0	75,000	2.1	700	9,000	4.5	15	IO	36
41/41E	6.3	0.4	250	250	−18.0	32.0	5.5	68,000	2.3	500	8,000	3.4	11	UX6	8
42 (P)	6.3	0.7	250	250	−16.5	34.0	6.5	80,000	2.5	410	7,000	3.2	8	UX6	8
807 (BT)	6.3	0.9	500	200	−14.5	50.0	1.6	39,000	5.7	280	6,000	11.5	12	UX5	6
12A6 (BT)	12.6	0.15	250	250	−12.5	30.0	3.5	70,000	3.0	350	7,500	3.4	7	IO	36
7D5 (P)	13.0	0.315	250	250	−16.5	34.0	6.5	80,000	2.5	410	7,000	3.2	8	B7	24
7D8 (P)	13.0	0.65	250	250	−6.0	32.0	6.0	60,000	10.0	150	8,500	3.75	10	B7	24
18 (P)	14.0	0.3	285	285	−20.0	38.0	7.0	78,000	2.55	440	7,000	4.5	9	UX6	8
2151	14.0	0.3	250	250	−31.0	47.0	11.6	50,000	2.4	500	5,000	5.0	—	UX6	8
25A6 (P)	25.0	0.3	160	120	−18.0	33.0	6.5	42,000	2.4	440	5,000	2.2	10	IO	36
43 (P)	25.0	0.3	160	120	−18.0	33.0	6.5	42,000	2.4	440	5,000	2.2	10	UX6	8
35A5 (BT)	35.0	0.15	200	110	−8.0	41.0	2.0	40,000	5.9	185	4,500	3.3	10	B8B	10
7D3 (P)	40.0	0.2	160	120	−18.0	33.0	6.5	42,000	2.4	440	5,000	2.2	10	B7	24
7D6 (P)	40.0	0.2	250	250	−6.0	32.0	6.0	60,000	10.0	150	8,500	3.75	10	B7	24
50A5 (BT)	50.0	0.15	200	110	−8.0	50.0	1.5	35,000	8.25	160	3,000	4.3	10	B8B	10
Replacement Types															
3V4 (BT)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	9
DL96/3C4 (P)	1.4*	0.05†	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
6AM5 / 7D9 (P)	6.3	0.2	250	250	−13.5	16.0	2.4	150,000	2.6	680	16,000	1.4	10	B7G	25
6CD6 (BT)	6.3	2.5	200	110	−14.0	80.0	5.3	—	—	180	1,500	4.7	13	IO	39
6L6 (BT)	6.3	0.9	350	250	−18.0	54.0	2.5	33,000	5.2	300	4,200	11.0	15	IO	36
6N7 (DT)	6.3	0.8	250	—	−5.0	3.0	—	23,000	1.6	1,000	30,000	0.2	—	IO	22
6V6 (BT)	6.3	0.45	315	225	−13.0	34.0	2.2	77,000	3.75	360	8,500	5.5	12	IO	36
7C5 (BT)	6.3	0.45	315	225	−13.0	34.0	2.2	77,000	3.75	330	8,500	5.0	11.5	B8B	10
ECL80/6AB8 (TP)	6.3	0.3	200	200	−8.0	17.5	3.3	150,000	3.3	—	11,000	1.4	10	B9A	13
EL41 (P)	6.3	0.7	250	250	−7.0	36.0	5.2	40,000	10.0	170	7,000	4.2	10	B8A	23
9BW6 (BT)	9.0	0.3	Other data as Type 6BW6												
12K5	12.6	0.45	12.6	12.6*	$-2.0g_2$	8.0	85*	800	7.0	—	800	0.035	10	B7G	69
19AQ5 (BT)	19.0	0.15	Other data as Type 6AQ5												
25L6 / G/25L6 (SQ) (BT)	25.0	0.3	200	110	−8.0	50.0	7.0	30,000	9.5	160	3,000	4.3	10	IO	36
35L6 (BT)	35.0	0.15	200	110	−8.0	41.0	2.0	40,000	5.9	185	4,500	3.3	10	IO	36
UL41 (P)	45.0	0.1	200	200	−14.2	45.0	8.5	24,000	8.2	250	4,300	4.2	10	B8A	7
50C5 / G/50C5 (SQ) (BT)	50.0	0.15	110	110	−7.5	49.0	4.0	10,000	7.5	140	2,500	1.9	9	B7G	42
50CD6 (BT)	50.0	0.3	Other data as Type 6CD6												
50L6 (BT)	50.0	0.15	200	110	−8.0	50.0	2.0	30,000	9.5	160	3,000	4.3	10	IO	36
Current Types															
6AK6 (P)	6.3	0.15	180	180	−9.0	15.0	2.5	200,000	2.3	520	10,000	1.1	10	B7G	16
6AQ5 (BT)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	240	5,000	4.5	8	B7G	27
6BW6 / 6061 (SQ) (BT)	6.3	0.45	315	225	−13.0	34.0	2.2	77,000	3.75	360	8,500	5.5	12	B9A	19
6CH6 / 6132 (SQ) (BT)	6.3	0.75	250	250	−4.5	40.0	6.0	50,000	11.0	100	6,000	3.0	8.5	B9A	19
5763 / 6062 (SQ) (BT)	6.0	0.75	300	225	−7.4	40.0	2.4	65,000	6.3	175	8,500	4.15	7.6	B9A	11
ECL82/6BM8 (TP)	6.3	0.78	200	200	−16.0	35.0	7.0	20,000	6.4	—	5,600	3.5	10	B9A	37
EL84/6BQ5 (P)	6.3	0.76	250	250	−7.3	48.0	5.5	38,000	11.0	135	5,200	5.7	10	B9A	16

(Continued)

Type	Heater		Volts			Current (mA)		r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen							Type	Ref.
BRIMAR *(Continued)*															
Current Types (Continued)															
ELL80 (DP)	6.3	0.55	250	250	−9.0	24.0	4.5	80,000	6.0	160	10,000	3.0	10	B9A	68
F/7001 (SQ) (BT)	6.3	0.45	120	120	—	35.0	4.0	15,000	4.8	250	2,500	1.0	9	B7G†	14
PL84 (P)	15.0	0.3	170	170	−12.5	70.0	5.0	23,000	10.0	170	2,400	5.6	10	B9A	16
PCL82 (TP)	16.0	0.3	200	200	−16.0	35.0	6.5	20,000	6.4	—	5,000	3.5	10	B9A	37
PCL85 (TP)	18.0	0.3	170	170	−15.0	41.0	2.7	25,000	7.5	—	4,000	3.4	—	B9A	66

* Space-charge grid. † Flying leads.

Type	Heater		Volts			Current (mA)		r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen							Type	Ref.
COSSOR															
Obsolete Types															
3A4 (P)	1.4*	0.2†	150	90	−8.4	13.3	2.2	100,000	1.9	—	8,000	0.7	—	B7G	7
215P (T)	2.0*	0.15	150	—	−7.5	10.0	—	4,000	2.25	—	9,000	0.15	—	B4	1
220HPT (P)	2.0*	0.2	150	150	−4.5	8.0	1.5	—	2.5	—	10,000	0.5	8	B5	6
220P (T)	2.0*	0.2	150	—	−7.5	11.0	—	4,000	2.25	—	9,000	0.19	5	B4	1
220PA (T)	2.0*	0.2	150	—	−4.5	10.0	—	4,000	4.0	—	9,000	0.18	5	B4	1
220PT (P)	2.0*	0.2	150	150	−9.0	19.0	4.0	—	2.5	—	7,500	1.0	8	B5	6
230PT (T)	2.0*	0.3	150	150	−15.0	14.0	3.0	—	2.0	—	10,000	1.0	8	B5	6
2XP (T)	2.0*	2.0	300	—	−36.0	50.0	—	900	7.0	700	4 000	3.15	5	B4	1
230XP (T)	2.0*	0.3	150	—	−18.0	22.0	—	1,500	3.0	—	3,500	0.45	5	B4	1
4XP (T)	4.0*	1.0	250	—	−28.5	48.0	—	900	7.0	600	3,000	3.0	5	B4	1
41MP (T)	4.0	1.0	200	—	−7.5	24.0	—	2,500	7.5	320	3,000	1.0	5	B5	1
41MXP (T)	4.0	1.0	200	—	−12.5	40.0	—	1,500	7.5	300	2,000	1.6	5	B5	1
42MPPen (P)	4.0	2.0	250	250	−5.5	32.0	6.0	—	7.0	140	8,000	3.1	8	B7	24
42OT (BT)	4.0	2.0	250	250	−5.5	34.0	6.0	—	7.0	140	8,000	3.1	8	B7	24
42OTDD (BT, DD)	4.0	2.0	250	250	−5.5	34.0	7.0	—	7.0	130	6,500	3.1	8	B7	9
MPPen (P)	4.0	1.0	250	250	−16.0	30.0	6.0	—	3.5	450	10,000	3.5	8	B7	24
PT41 (P)	4.0	1.0	250	200	−12.5	30.0	6.0	—	3.0	350	8,000	2.6	8	B5	6
PT41B (P)	4.0	1.0	400	300	−40.0	30.0	6.0	—	2.25	1,200	8,000	3.6	8	B5	6
6K6 (P)	6.3	0.4	315	285	−21.0	25.5	9.0	75,000	2.1	700	9,000	4.5	15	IO	36
6L6 (BT)	6.3	0.9	300	200	−13.0	54.5	4.6	33,000	5.2	220	4,500	6.5	11	IO	36
35A5 (BT)	35.0	0.15	200	110	−8.0	44.0	7.0	40,000	5.9	157	4,500	3.3	10	B8B	10
40PPA (P)	40.0	0.2	150	150	−25.0	3.6	6.0	—	4.0	600	4,000	2.3	8	B7	24
402OT (BT)	40.0	0.2	250	250	−12.0	32.0	32.0	—	7.0	310	8,000	2.5	8	B7	15
402P (T)	40.0	0.2	200	—	−12.5	40.0	—	1,330	7.5	320	2,500	1.6	8	B7	23
402Pen (P)	40.0	0.2	200	200	−6.7	40.0	—	—	7.0	137	5,500	3.1	10	B7	15
402PenA (P)	40.0	0.2	150	150	−9.0	56.0	11.0	—	8.0	130	2,500	3.0	8	B7	15
Replacement Types															
1C5 (P)	1.4*	0.1	90	90	−7.5	7.8	3.5	115,000	1.55	—	8,000	0.24	10	IO	78
2P (T)	2.0	0.7	250	—	−22.0	40.0	—	1,150	7.0	—	3,000	2.0	5	B4	1
220OT (BT)	2.0	0.2	150	150	−4.5	9.5	2.0	—	2.5	—	20,000	0.5	8	B5	6
PT10 (P)	4.0	2.0	250	250	−7.5	40.0	—	—	9.0	160	5,000	4.2	10	B7	24
6V6 (BT)	6.3	0.45	315	225	−13.0	35.0	6.0	77,000	3.75	315	8,500	5.5	12	IO	36
142BT (BT)	14.0	0.2	180	180	−8.5	29.0	3.0	58,000	3.7	265	5,500	2.0	8	IO	36
CL33/332Pen (P)	33.0	0.2	200	200	−8.5	45.0	6.0	—	8.0	167	4,500	4.0	10	IO	36
Current Types															
DL92 (BT)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.58	—	8,000	0.27	12	B7G	6
DL94 (P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	9
DL96 (P)	1.4*	0.05	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
6C4 (T)	6.3	0.15	250	—	−8.5	10.5	—	7,700	2.2	—	—	—	—	B7G	15
7C5 (BT)	6.3	0.45	315	225	−13.0	35.0	6.0	77,000	3.75	315	8,500	5.5	12	B8B	10
807 (BT)	6.3	0.9	300	250	−14.0	83.0	8.0	20,000	6.5	155	2,850	6.7	—	UX5	6
ECL80/6AB8 (TP)	6.3	0.3	170	170	−6.7	15.0	2.8	150,000	3.2	—	11,000	1.0	10	B9A	13
ECL82 (TP)	6.3	0.78	250	250	−22.5	28.0	5.5	25,000	5.0	680	9,000	3.4	10	B9A	37
ECL83 (TP)	6.3	0.6	200	200	−1.3	27.0	4.4	65,000	5.0	—	7,500	2.5	10.5	B9A	27
EL38 (P)	6.3	1.4	275	275	−9.0	91.0	11.0	—	14.0	—	—	—	—	IO	40
EL41/67PT (P)	6.3	0.7	250	250	−7.0	36.0	5.2	40,000	10.0	170	7,000	4.2	10	B8A	23
EL42 (P)	6.3	0.2	225	225	−10.0	26.0	4.1	90,000	3.2	360	9,000	2.5	10	B8A	23
EL81 (P)	6.3	1.05	250	250	−38.5	32.0	2.4	15,000	4.6	—	—	—	—	B9A	17
EL84/6BQ5 (P)	6.3	0.76	250	250	−7.3	48.0	5.5	38,000	11.3	135	5,200	5.7	10	B9A	16
EL86 (P)	6.3	0.76	170	170	−12.5	70.0	5.0	23,000	10.0	—	2,400	5.6	10	B9A	16
EL822 (P)	6.3	0.75	250	150	−2.5	40.0	5.0	100,000	13.0	—	—	—	—	B9A	19
PCL83 (TP)	12.6	0.3	170	170	−9.5	30.0	5.0	53,000	5.5	—	5,500	2.2	10	B9A	27
PCL84 (TP)	15.0	0.3	220	220	−3.4	18.0	3.1	150,000	10.0	—	—	—	—	B9A	53
PL83 (P)	15.0	0.3	170	170	−2.3	36.0	5.0	100,000	10.0	—	—	—	—	B9A	14
PL84 (P)	15.0	0.3	250	250	−5.5	36.0	5.0	130,000	10.0	—	—	—	—	B9A	16
PCL82 (TP)	16.0	0.3	170	170	−11.5	41.0	7.5	16,000	7.5	—	3,900	3.3	10	B9A	37
PL82/16A5 (P)	16.5	0.3	170	170	−10.4	53.0	10.0	20,000	9.5	—	3,000	4.2	10	B9A	16
UL41/451PT (P)	45.0	0.1	170	170	−10.4	53.0	10.0	20,000	9.5	140	3,000	4.2	10	B8A	23
UL84 (P)	45.0	0.1	170	170	−12.5	70.0	5.0	23,000	10.0	170	2,400	5.6	10	B9A	16
UCL82 (TP)	50.0	0.1	Other data as PCL82												

Type	Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
EMITRON															
Current Types															
3A4 (BT)	1.4*	0.2†	150	90	−8.4	13.3	2.2	100,000	1.9	—	8,000	0.7	6	B7G	7
3S4 (BT)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.58	—	8,000	0.27	12	B7G	6
6AM5 (P)	6.3	0.2	250	250	−13.5	16.0	2.4	130,000	2.6	730	16,000	1.4	10	B7G	25
6AQ5 (BT)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	240	5,000	4.5	8	B7G	27
6L6G (BT)	6.3	0.9	350	250	−18.0	54.0	2.5	33,000	5.2	300	4,200	10.8	15	IO	36
7C5 (BT)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	250	5,000	4.5	8	B8B	10
807 (BT)	6.3	0.9	500	200	−14.5	50.0	1.6	39,000	5.7	280	6,000	11.5	12	UX5	6
35A5 (BT)	35.0	0.15	200	110	−8.0	41.0	2.0	40,000	5.9	185	4,500	3.3	10	B8B	10
EDISWAN MAZDA															
Obsolete Types															
Pen141 (P)	1.4*	0.1	90	90	−9.0	5.5	1.1	—	1.4	—	10,000	0.24	12	MO	3
P215 (T)	2.0*	0.15	150	—	−13.5	5.8	—	6,500	1.1	—	11,000	0.15	5	B4	1
P220 (T)	2.0*	0.2	150	—	−7.0	5.5	—	5,600	2.2	—	10,000	0.15	5	B4	1
P220A (T)	2.0*	0.2	150	—	−14.0	15.0	—	2,400	2.7	—	4,100	0.35	5	B4	1
PA20 (T)	2.0*	2.0	300	—	−36.0	48.0	—	1,100	5.2	750	3,000	4.2	5	B4	1
Pen24 (P)	2.0*	0.3	120	120	−3.3	5.0	1.0	—	4.0	—	15,000	0.37	16	MO	3
Pen25 (P)	2.0*	0.15	120	120	−3.6	5.0	1.0	350,000	3.0	—	14,000	0.4	16	MO	3
Pen220 (P)	2.0*	0.2	150	150	−4.9	9.0	1.6	—	2.2	—	14,000	0.6	7	B5	6
Pen220A (P)	2.0*	0.2	150	150	−9.0	18.0	3.6	270,000	2.2	—	6,000	1.1	7	B5	6
Pen231 (P)	2.0*	0.3	120	120	−2.5	5.0	1.0	500,000	3.6	—	19,000	0.37	14	B5	6
AC/P (T)	4.0	1.0	200	—	−13.5	17.0	—	3,700	2.7	800	5,000	0.65	7	B5	1
ACP1 (T)	4.0	1.0	200	—	−28.0	24.0	—	2,200	2.3	1,500	5,000	1.0	5	B5	1
AC/Pen (P)	4.0	1.0	250	250	−15.5	32.0	6.0	75,000	2.7	410	7,500	3.3	7	B7	24
AC/2Pen (P)	4.0	1.75	250	250	−5.3	32.0	6.0	110,000	8.5	140	6,700	3.5	7	B7	24
AC/2PenDD (P, DD)	4.0	2.0	250	250	−5.3	32.0	6.0	110,000	8.5	140	6,700	3.5	7	B7	9
AC/4Pen (BT)	4.0	1.75	250	250	−8.75	64.0	13.0	20,000	12.0	115	3,300	6.9	7	B7	24
AC/5Pen (BT)	4.0	1.75	250	250	−8.5	40.0	7.5	—	9.4	180	5,200	4.85	7	B7	24
AC/5PenDD(BT, DD)	4.0	2.0	250	250	−8.5	40.0	7.5	—	9.4	180	5,200	4.85	7	B7	9
PP3/250 (T)	4.0*	1.0	300	—	−37.0	48.0	—	1,100	5.2	770	3,000	4.2	5	B4	1
PP5/400 (T)	4.0*	2.0	400	—	−32.0	62.5	—	1,100	8.0	510	2,700	5.9	5	B4	1
Pen44 (BT)	4.0	2.1	260	270	−11.1	70.0	12.0	—	10.6	135	3,000	8.0	7	MO	20
Pen44 (T)	4.0	2.1	275	—	−13.6	57.0	—	1,200	11.5	240	2,400	3.2	5	MO	20
Pen45, Pen45AN(SQ) (BT)	4.0	1.75	250	250	−8.5	40.0	8.0	40,000	8.8	180	5,000	4.5	7	MO	20
Pen45 (T)	4.0	1.75	250	—	−9.8	35.0	—	1,900	9.3	280	3,500	1.7	5	MO	20
Pen45DD (BT, DD)	4.0	2.0	250	250	−8.5	40.0	8.0	40,000	8.8	180	5,000	4.5	7	MO	15
Pen1340 (P)	13.0	0.4	240	240	−8.6	41.0	8.0	80,000	6.4	175	5,500	3.5	7	B7	24
PenDD1360 (P, DD)	13.0	0.6	250	250	−5.3	32.0	6.0	100,000	8.2	140	6,700	3.5	7	B7	9
Pen3520 (P)	35.0	0.2	200	200	−8.0	40.0	8.0	67,000	7.3	165	4,400	3.0	7	B7	24
PP3521 (T)	35.0	0.2	200	—	−25.0	70.0	—	950	6.3	360	2,000	2.3	5	B7	16
Pen383 (BT)	38.0	0.2	160	175	−10.0	64.0	13.0	—	10.5	130	2,600	3.75	7	MO	20
Pen384 (BT)	38.0	0.2	110	110	−7.0	40.0	2.9	—	7.8	160	2,200	1.9	10	MO	20
Pen3820 (BT)	38.0	0.2	160	175	−10.0	64.0	13.0	—	10.5	130	2,600	3.75	7	B7	24
PenDD4020 (P, DD)	40.0	0.2	240	250	−7.5	43.0	8.5	—	7.8	150	4,800	3.9	7	B7	9
Pen453DD (BT, DD)	45.0	0.2	160	175	−10.0	64.0	13.0	—	10.5	130	2,600	3.75	7	MO	15
PenDD4021 (BT)	45.0	0.2	160	175	−10.0	64.0	13.0	—	10.5	130	2,600	3.75	7	B7	9
Replacement Types															
1P10, 3S4 (P)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	—	1.57	—	8,000	0.27	12	B7G	6
1P11, 3V4 (P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	9
6P1 (BT)	6.3	0.8	250	250	−8.5	40.0	7.5	40,000	8.8	180	5,000	4.2	7	IO	36
6P25 (BT)	6.3	1.1	250	250	−8.5	40.0	8.0	40,000	8.8	180	5,000	4.5	7	IO	36
20P3 (BT)	20.0	0.2	195	210	−11.5	51.0	12.7	—	7.4	180	3,700	4.5	7	IO	36
20P5 (BT)	20.0	0.2	180	150	−6.3	29.0	5.8	—	7.5	180	5,400	2.6	10	B8A	7
10P13 (BT)	40.0	0.1	180	150	−6.3	29.0	5.8	—	7.5	180	5,400	2.6	10	B8A	7
10P14 (BT)	40.0	0.1	195	210	−11.5	51.0	12.7	—	7.4	180	3 700	4.5	7	IO	36
Current Types															
1P1	1.4*	0.05†	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
6P15 (P)	6.3	0.76	250	250	−7.3	48.0	5.5	38,000	11.3	135	4,000	5.4	10	B9A	16
6P17 (P)	6.3	0.2	250	250	−13.5	16.0	2.4	—	2.6	740	16,000	1.4	10	B7G	77
6PL12 (T, BT)	6.3	0.78	250	250	−22.5	28.0	5.5	25,000	5.0	680	9,000	3.4	10	B9A	37
11A1 (T)	6.3	0.95	600△	—	—	—	—	—	—	—	—	—	—	B9A	62
S11E12 (SQ) (BT)	6.3	1.6	800***	300***	—	—	—	—	—	—	—	—	—	IO	38
30P12 (BT)	12.6	0.3	170	180	−10.3	31.0	7.3	—	6.7	270	5,000	2.25	7	B9A	16

(Continued)

Type	Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
EDISWAN MAZDA (*Continued*)															
Current Types (*Continued*)															
30PL1 (T, BT)	13.0	0.3	170	180	−9.6	28.0	6.5	—	6.5	270	6,000	2.0	7	B9A	27
13E‡ (BT)	13.0	2.6†	800ϕ	300ϕ	—	—	—	—	—	—	—	—	—	B7A	2
30P18 (P)	15.0	0.3	160	170	−12.5	70.0	5.0	23,000	10.0	—	2,200	5.2	10	B9A	16
30PL12 (T, BT)	16.0	0.3	200	200	−16.0	35.0	7.0	—	6.4	390	5,600	3.5	10	B9A	37
30PL13 (T, BT)	16.0	0.3	170	170	−13.5	45.0	9.0	—	7.5	TV frame–output valve				B9A	37
30PL14 (T, BT)	16.0	0.3	170	170	−15.0	50.0	3.0	—	7.6	TV frame–output valve				B9A	37
30P16 (P)	16.5	0.3	170	170	−10.4	53.0	10.0	20,000	9.0	165	3,000	4.0	10	B9A	16
10P18 (P)	45.0	0.1	160	170	−12.5	70.0	5.0	23,000	10.0	—	2,200	5.2	10	B9A	16
10PL12 (T, BT)	50.0	0.1	200	200	−16.0	35.0	7.0	—	6.4	390	5,600	3.5	10	B9A	37

*** Maximum Values for use in stabilized h.t. supply circuits. $I_{K(max)}$=300mA, $P_{a(max)}$=35W
ϕ Maximum Values for use in stabilized h.t. supply circuits. $I_{K(max)}$=800mA, $P_{a(max)}$=90W
‡ Maximum Values for use in stabilized h.t. supply circuits. $I_{K(max)}$=300mA, $P_{a(max)}$=28W
△ Maximum Values for use in stabilized h.t. supply circuits. $I_{K(max)}$=120mA, $P_{a(max)}$=15W

FERRANTI															
Obsolete Types															
LP2 (T)	2.0*	0.3	150	—	−18.0	22.0	—	1,500	3.0	—	3,500	0.45	5	B4	1
PTZ (P)	10.0	0.2	250	250	−6.2	32.5	5.0	—	7.5	160	5,000	—	—	B7	15
PTA (P)	13.0	0.3	250	250	−9.8	32.5	6.0	—	6.0	250	7,000	—	—	B7	24
PTSD (DD, P)	26.0	0.3	250	200	−5.0	40.0	7.0	—	6.0	120	6,000	3.5	—	B7	9
Replacement Types															
1A5 (P)	1.4*	0.05	90	90	−4.5	4.0	1.1	300,000	0.85	—	25,000	0.115	7	IO	78
1C5 (P)	1.4*	0.1	90	90	−7.5	7.8	3.5	115,000	1.55	—	8,000	0.24	10	IO	78
3Q5 (BT)	1.4*	0.1†	90	90	−4.5	9.5	1.3	80,000	2.15	—	10,000	0.27	6	IO	87
3S4 (P)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.58	—	8,000	0.27	12	B7G	6
PT2 (P)	2.0*	0.2	120	120	−4.5	5.3	1.1	—	2.6	—	20,000	0.35	—	B5	6
L4 (T)	4.0*	1.0	250	—	−16.0	20.0	—	3,300	3.2	800	10,000	0.5	4	B5	1
LP4 (T)	4.0*	1.0	250	—	−36.0	48.0	—	870	5.5	700	2,500	3.0	4	B4	1
PT4 (P)	4.0	2.0	250	250	−6.0	32.5	7.0	—	7.5	150	6,500	3.5	10	B7	24
PT4D (DD, P)	4.0	2.0	250	250	−6.0	32.5	7.0	—	7.5	150	6,500	3.5	10	B7	9
6AQ5/EL90 (P)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	250	5,000	4.5	8	B7G	27
6AM5/EL91 (P)	6.3	0.2	250	250	−13.5	16.0	2.4	250,000	2.6	750	6,000	2.0	10	B7G	25
6C4 (T)	6.3	0.15	250	—	−8.5	10.5	—	7,700	2.2	—	—	—	—	B7G	15
6F6 (P)	6.3	0.7	285	285	−22.0	38.0	12.0	78,000	2.55	440	7,000	4.5	9	IO	36
6K6 (P)	6.3	0.4	250	250	−18.0	32.0	5.5	68,000	2.3	470	7,600	3.4	10	IO	36
6V6 (BT)	6.3	0.45	315	225	−13.0	35.0	6.0	77,000	3.75	315	8,500	5.5	12	IO	36
6Y6 (BT)	6.3	1.25	200	135	−14.0	66.0	9.0	18,300	7.1	186	2,600	6.0	10	IO	36
7C5 (BT)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	240	5,000	4.5	8	B8B	10
807 (BT)	6.3	0.9	500	200	−14.5	50.0	1.6	39,000	5.7	280	6,000	11.5	12	UX5	6
EL41/6CK5 (P)	6.3	0.7	250	250	−7.0	36.0	5.2	40,000	10.0	170	7,000	4.2	10	B8A	23
EL42 (P)	6.3	0.2	225	225	−12.5	26.0	4.1	90,000	3.2	360	9,000	2.5	10	B8A	23
12A6 (BT)	12.6	0.15	250	250	−12.5	30.0	3.5	70,000	3.0	375	7,500	2.4	—	IO	36
25L6 (BT)	25.0	0.3	200	110	−8.0	55.0	7.0	30,000	9.5	160	3,000	4.3	10	IO	36
35L6 (BT)	35.0	0.15	200	110	−8.0	44.0	7.0	40,000	5.9	185	4,500	3.3	10	IO	36
UL41 (P)	45.0	0.1	200	200	−14.2	45.0	8.5	24,000	8.2	—	4,300	4.2	10	B8A	23
50L6 (BT)	50.0	0.15	200	110	−8.0	55.0	7.0	30,000	9.5	160	3,000	4.3	10	IO	36
Current Types															
DL96/3C4 (P)	1.4*	0.05†	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
3V4/DL94 (P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	9
6L6 (BT)	6.3	0.9	300	200	−13.0	54.5	4.6	33,000	5.2	220	4,500	6.5	11	IO	36
ECL80/6AB8 (TP)	6.3	0.3	200	200	−8.0	17.5	3.3	150,000	3.3	—	11,000	1.4	10	B9A	13
ECL82 (TP)	6.3	0.78	250	250	−22.5	28.0	5.7	25,000	5.0	680	9,000	3.4	10	B9A	37
ECL83 (TP)	6.3	0.6	200	200	−13.0	27.0	4.4	65,000	5.0	—	7,500	2.5	10.5	B9A	27
EL84/6BQ5 (P)	6.3	0.76	250	250	−7.3	48.0	5.5	38,000	11.0	135	5,200	5.7	10	B9A	16
EL85/6BN5 (P)	6.3	0.2	225	225	−10.8	26.0	4.1	90,000	3.2	360	9,000	2.8	12	B9A	26
PCL83 (TP)	12.6	0.3	200	200	−13.0	27.0	4.4	55,000	5.5	—	7,500	2.5	10	B9A	27
PCL84 (TP)	15.0	0.3	200	200	−2.9	18.0	3.1	30,000	10.0	—	—	—	—	B9A	53
PL84 (P)	15.0	0.3	170	170	−12.5	70.0	3.5	26,000	10.8	—	2,400	5.6	10	B9A	16
PCL82/16A8 (TP)	16.0	0.3	170	170	−11.5	41.0	7.5	16,000	7.5	—	—	—	—	B9A	37
UCL83 (TP)	40.0	0.1	170	170	−9.5	30.0	5.0	53,000	5.5	—	5,500	2.2	10	B9A	27
UL84 (P)	45.0	0.1	170	170	−12.5	70.0	5.0	23,000	10.0	—	2,400	5.6	10	B9A	16
UCL82 (TP)	50.0	0.1	200	200	−16.0	35.0	7.0	20,000	6.6	—	5,600	3.5	10	B9A	37
G.E.C.															
Obsolete Types															
N15 (P)	1.4*	0.1†	90	90	−7.0	7.0	1.7	—	1.55	—	8,000	0.25	12	IO	87
N17 (P)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	—	1.58	—	8,000	0.27	12	B7G	6
KT21 (BT)	2.0*	0.3	150	120	−2.5	5.3	1.0	—	5.3	—	19,000	0.46	—	B5	6
KT24 (BT)	2.0*	0.2	150	150	−2.8	10.0	2.1	—	3.2	200	10,000	0.64	10	B5	6

(Continued)

Type	Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
G.E.C. (*Continued*)															
Obsolete Types (Continued)															
L12	(T)	2.0*	0.06	45	—	−4.0	2.2	—	—	0.8	2,000	10,000	0.012	6	Sm4	1
LP2	(T)	2.0*	0.2	150	—	−4.5	10.0	—	4,170	3.6	—	7,000	0.15	—	B4	1
KT42	(BT)	4.0	1.0	250	—	−16.5	34.0	5.5	7,000	2.5	420	7,000	3.25	—	B7	24
KT45	(BT)	4.0	2.0	‡	300	−15.0	85.0	6.3	—	6.3	160	2,200	7.25	9	B7	37
N43	(P)	4.0	2.0	250	250	−4.4	40.0	10.0	—	10.0	90	5,400	4.5	—	B7	15
PT25	(P)	4.0*	2.0	400	200	−22.0	62.5	10.6	—	4.0	330	6,000	10.0	—	B5	6
KT30	(BT)	13.0	0.3	250	250	−12.0	40.0	7.0	—	3.9	260	7,500	2.7	—	B7	24
KT35	(BT)	13.0	0.6†	200	200	−11.5	50.0	8.5	—	10.0	200	4,000	4.2	—	IO	73
KT31	(BT)	26.0	0.3	200	180	−4.0	40.0	10.6	5,500	10.0	80	5,500	2.5	—	B7	15
KT32	(BT)	26.0	0.3	135	135	−7.6	75.0	5.0	—	9.0	95	1,300	3.5	11	IO	36
KT33	(BT)	26.0	0.3	200	200	−13.2	60.0	10.0	—	10.0	190	3,000	5.0	—	IO	36
KT71	(BT)	48.0	0.16	175	175	−9.8	70.0	12.0	—	10.0	120	2,500	5.0	9	IO	36
Replacement Types															
DL94/N19	(P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	58
N14	(P)	1.4*	0.1	90	90	−7.0	7.0	1.7	—	1.55	700	8,000	0.25	—	IO	78
N16	(P)	1.4*	0.1†	90	90	−4.5	9.5	1.3	125,000	2.1	—	8,000	0.27	6	IO	87
N18/3Q4	(P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	6
KT2	(BT)	2.0*	0.2	150	150	−4.5	7.5	1.7	—	2.5	—	17,000	0.5	—	B5	6
P2	(T)	2.0*	0.2	150	—	−10.0	19.0	—	2,150	3.5	—	4,500	0.3	—	B4	1
DN41	(P, DD)	4.0	2.3	250	200	−3.3	32.0	8.0	—	10.0	90	7,800	4.5	—	B7	9
KT41	(BT)	4.0	2.0	250	250	−4.4	50.0	8.5	—	10.5	90	6,000	4.3	8	B7	24
MKT4	(BT)	4.0	1.0	250	225	−13.5	32.0	5.0	—	3.0	365	8,000	2.5	10	B7	24
PX4	(T)	4.0*	1.0	300	—	−50.0	50.0	—	830	6.0	1,000	3,500	4.5	4	B4	1
PX25	(T)	4.0*	2.0	500	—	−50.0	50.0	—	1,265	7.5	1,000	5,500	8.5	7	B4	1
A2134	(P)	6.3	0.635	165	165	−9.3	53.0	9.0	23,200	9.5	150	3,000	4.1	10	B7G	25
ECL80	(TP)	6.3	0.3	100	—	−2.3	—	4.0	12,500	1.4	—	—	—	—	B9A	13
ECL82	(TP)	6.3	0.78	100	—	0	—	3.5	28,000	2.5	—	—	—	—	B9A	37
ECL83	(TP)	6.3	0.6	200	—	−1.5	—	2.5	34,000	2.5	—	—	—	—	B9A	27
EL84/N709	(P)	6.3	0.76	250	250	−7.5	48.0	—	38,000	11.3	120	5,000	6.0	10	B9A	16
EL90/N727	(BT)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	240	5,000	4.5	8	B7G	27
EL91/N77 QA2402 (SQ)	(P)	6.3	0.2	250	250	−12.0	16.0	3.0	130,000	2.6	680	16,000	1.4	10	B7G	25
KT61	(BT)	6.3	0.95	250	250	−4.4	40.0	7.5	—	10.5	90	6,000	4.3	8	IO	36
KT63	(BT)	6.3	0.7	250	250	−16.5	34.0	5.5	—	2.5	420	7,000	3.0	—	IO	36
KT81	(BT)	6.3	0.95	250	250	−4.4	40.0	7.5	—	10.8	90	6,000	4.3	8	B8B	10
N78	(P)	6.3	0.64	250	250	−5.5	36.0	5.0	40,000	10.0	120	7,000	4.0	10	B7G	25
HN309	(TP)	12.6	0.3	165	165	—	32.0	6.0	45,000	4.7	220	6,000	2.1	10	B9A	27
PCL83/LN309	(TP)	12.6	0.3	165	165	−8.4	32.0	6.5	45,000	4.7	220	6,000	2.1	10	B9A	27
KT33C	(BT)	13.0	0.6†	200	200	−13.3	60.0	10.0	—	10.0	190	3,000	5.0	8	IO	73
LN319	(T, BT)	13.0	0.3	170	180	−9.6	28.0	6.5	—	6.0	270	6,000	2.0	7	B9A	27
KT76	(BT)	15.0	0.16	175	175	−13.0	35.0	6.0	—	2.5	300	5,000	2.0	4.5	IO	36
PCL84	(TP)	15.0	0.3	200	200	−2.9	18.0	3.0	130,000	10.4	—	—	—	—	B9A	53
PL83/N309	(P)	15.0	0.3	170	170	−2.5	18.0	4.2	41,000	10.0	68	5,000	1.65	7.8	B9A	14
PL84/N379	(P)	15.0	0.3	250	250	−5.5	36.0	5.0	13,000	10.0	—	—	—	—	B9A	16
PL82/N329	(P)	16.5	0.3	170	170	−10.6	50.0	9.0	20,000	9.0	180	3,000	4.0	10	B9A	16
UCL83	(TP)	38.0	0.1	200	200	−13.0	27.0	4.4	45,000	5.5	220	6,000	2.5	10	B9A	27
N108	(P)	40.0	0.1	165	165	−9.3	53.0	9.0	23,200	9.5	150	3,000	4.1	10	B7G	25
UL41	(P)	45.0	0.1	170	170	−10.4	53.0	10.0	20,000	9.5	160	3,000	4.2	10	B8A	7
KT101	(BT)	80.0	0.1	200	200	−12.5	60.0	10.0	—	10.0	180	3,000	5	12	B8B	10
	(T)			175	—	−7.5	120.0	—	—	11.5	—	—	—	—	B8B	10
Current Types															
DAF91/ZD17	(SD)	1.4*	0.05	90	90	0	2.7	0.63	1,500	0.72	—	—	—	—	B7G	5
DAF96/ZD25	(SD)	1.4*	0.025	67.5	67.5	−1.5	0.17	0.055	—	0.17	—	—	—	—	B7G	5
DL96/N25	(P)	1.4	0.05	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
KT66	(BT)	6.3	1.27	250	250	−15.0	85.0	6.3	22,500	6.3	160	2,200	7.25	9	IO	36
KT88	(BT)	6.3	1.6	300	300	−20.0	130.0	13.5	—	12.0	11,150	3,500	—	7	IO	A
N369	(BT)	12.6	0.3	170	180	−10.3	31.0	7.3	—	6.7	270	5,000	2.25	7	B9A	16
N308	(BT)	25.0	0.3	400	250	—	—	—	—	—	—	—	—	—	IO	129
N118	(BT)	40.0	0.1	180	150	−6.3	29.0	5.8	—	7.5	180	5,400	2.6	10	B8A	7
UL84/N119	(P)	45.0	0.1	170	170	−12.5	70.0	5.0	230,000	10.0	170	2,200	5.2	10	B9A	16
UCL82/LN119	(TP)	50.0	0.1	100	—	0	—	3.5	28,000	2.5	—	—	—	—	B9A	37

‡ Maximum anode voltage, 8,000 peak.

Type	Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
HIVAC															
Obsolete Types															
XHP1.5V	(DT)	1.5*	0.16 (1)	50	—	−4.5	1.75	—	7,250	0.72	—	8,500	0.0062	—	Sm5	3
			(2)	50	—	0	0.45	—	50,000	0.50	—	—	—	—		
XFY11	(P)	1.25*	0.025	22.5	22.5	0	0.3	0.009	—	0.42	—	200,000	0.0012	—	B5A	1
XFY12	(P)	1.25*	0.025	22.5	22.5	−0.5	0.25	0.08	—	0.37	—	175,000	0.00175	—	B5A	1

(Continued)

Type	Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
HIVAC (*Continued*)															
Obsolete Types (Continued)															
XFY21	(BT)	1.25*	0.0125	22.5	22.5	0	0.38	0.095	—	0.41	—	1,000,000	0.0018	—	B5A	1
XFY23	(BT)	1.25*	0.0175	22.5	22.5	−2.0	0.4	0.09	—	0.34	—	50,000	0.00375	—	B5A	1
XY1.4B	(P)	1.25*	0.025	45	45	−4.5	1.5	0.45	50,000	0.6	—	30,000	0.0275	—	B5A	1
XY1.4C	(P)	1.25*	0.025	45	45	−1.5	0.5	0.10	250,000	0.5	—	100,000	0.0065	—	B5A	1
XFY10	(P)	1.25*	0.025	22.5	22.5	−1.25	0.5	0.2	—	0.35	—	50,000	0.003	—	B5A	1
XY1.4A	(P)	1.4*	0.032	45	45	−4.5	1.75	0.75	40,000	0.55	—	30,000	0.010	—	B5A	1
XP1.5V	(T)	1.5*	0.08	50	—	−4.5	1.75	—	7,250	0.72	—	8,500	0.0067	—	Sm4	1
XY1.5V	(P)	1.5*	0.16	45	45	−1.5	1.75	0.35	66,000	1.0	—	27,000	0.014	—	Sm5	1
P215	(T)	2.0*	0.15	150	—	−12.0	8.0	—	3,600	2.2	—	10,000	0.15	—	B4	1
P220	(T)	2.0*	0.2	150	—	−7.5	6.0	—	4,750	3.0	—	9,000	0.18	—	B4	1
PP220	(T)	2.0*	0.2	150	—	−12.0	12.5	—	2,300	3.0	—	5,000	0.25	—	B4	1
PX230	(T)	2.0*	0.3	150	—	−15.0	17.5	—	1,850	3.5	—	4,000	0.45	—	B4	1
XP2.0V	(T)	2.0*	0.08	50	—	−3.0	2.0	—	6,000	1.0	—	7,200	0.0052	—	Sm4	1
XY2.0V	(P)	2.0*	0.16	50	50	−2.0	1.75	0.4	60,000	1.4	—	25,000	0.020	—	Sm5	1
Y220	(TT)	2.0*	0.2	150	150	−4.5	10.5	1.3	—	—	—	11,500	0.5	—	B4 B5	7 6
Y230	(TT)	2.0*	0.3	150	150	−3.0	7.0	1.0	—	—	—	20,000	0.4	—	B5	6
Z220	(TT)	2.0*	0.2	150	150	−6.0	18.0	2.1	—	—	—	7,500	1.0	—	B4 B5	7 6
ACL	(T)	4.0	1.0	250	—	−13.5	17.0	—	2,350	4.25	760	6,300	0.67	—	B5	1
ACQ	(TT)	4.0	1.35	375	250	−22.0	57.0	2.5	—	—	370	4,000	11.5	—	B7	24
ACY	(TT)	4.0	1.0	250	250	−10.0	32.0	4.3	—	—	30	6,500	3.0	—	B5 B7	7 24
ACZ	(TT)	4.0	2.0	250	250	−5.5	32.0	4.3	—	—	160	6,500	3.0	—	B5 B7	7 24
ACZDD	(DD, TT)	4.0	2.0	250	250	−5.5	32.0	4.3	—	—	160	6,500	3.0	—	B7	9
FY	(TT)	4.0*	1.0	250	250	−10.0	32.0	6.0	—	—	250	6,000	3.0	—	B5	6
PX5	(T)	4.0*	2.0	400	—	−34.0	62.5	—	1,480	6.5	530	3,000	5.75	—	B4	1
6C4	(T)	6.3	0.15	250	—	−8.5	10.5	—	7,700	2.2	—	—	—	—	B7G	15
Y13	(TT)	13.0	0.3	250	250	−22.0	35.0	4.5	—	—	550	4,000	3.0	—	B7	24
Z26	(TT)	26.0	0.3	250	250	−5.5	32.0	4.3	—	—	160	6,500	3.0	—	B7	24
Current Types															
XFY14	(P)	1.25*	0.05	67.5	67.5	−6.5	3.1	0.95	—	0.65	—	—	0.07	—	B5A	1
XFY15	(P)	1.25*	0.02	67.5	67.5	−6.5	3.1	0.95	—	0.65	—	—	0.07	—	B5A	1
XFY31	(P)	1.25*	0.0125	22.5	22.5	0	0.38	0.095	—	0.41	—	100,000	0.0018	—	B5A	1
XFY32	(P)	1.25*	0.0125	16.25	16.25	0	0.44	0.1	—	0.35	—	100,000	0.0018	—	B5A	1
XFY33	(P)	1.25*	0.0175	15	15	−1.2	0.2	0.05	—	0.23	—	75,000	0.001	—	B5A	1
XFY41	(P)	1.25*	0.01	22.5	22.5	0	0.38	0.095	—	0.41	—	100,000	0.0018	—	B5A	1
XFY43	(P)	1.25*	0.01	15	15	−1.2	0.2	0.05	—	0.23	—	75,000	0.001	—	B5A	1
XFY51	(P)	1.25*	0.01	22.5	22.5	0	0.32	0.09	—	0.32	—	80,000	0.0023	—	B5A	1
XFY53	(P)	1.25*	0.01	22.5	22.5	−3.0	0.45	0.17	—	0.34	—	40,000	0.00375	—	B5A	1
XFY54	(P)	1.25*	0.01	22.5	22.5	−2.0	0.34	0.08	—	0.28	—	30,000	0.00275	—	B5A	1

Type	Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
MARCONI															
Obsolete Types															
N14	(P)	1.4*	0.1	90	90	−7.0	7.0	1.7	—	1.55	700	8,000	0.25	—	IO	78
N15	(P)	1.4*	0.1†	90	90	−7.0	7.0	1.7	—	1.55	—	8,000	0.25	12	IO	87
N16	(P)	1.4*	0.1†	90	90	−4.5	9.5	1.3	—	2.1	—	8,000	0.27	6	IO	87
KT21	(BT)	2.0*	0.3	150	120	−2.5	5.3	1.0	—	5.3	—	19,000	0.46	—	B5	6
KT24	(BT)	2.0*	0.2	150	150	−2.8	10.0	2.1	—	3.2	200	10,000	0.64	10	B5	6
KT42	(BT)	4.0	1.0	250	250	−16.5	34.0	5.5	—	2.5	420	7,000	3.25	—	B7	24
KT45	(BT)	4.0	2.0	‡	300	−15.0	85.0	6.3	—	6.3	160	2,200	7.25	9	B7	37
N43	(P)	4.0	2.0	250	250	−4.4	40.0	10.0	—	10.0	90	5,400	4.5	—	B7	15
PT25	(P)	4.0*	2.0	400	200	−22.0	62.5	10.6	—	4.0	330	6,000	10.0	—	B5	6
KT81	(BT)	6.3	0.95	250	250	−4.4	40.0	7.5	—	10.8	90	6,000	4.3	8	B8B	10
KT30	(BT)	13.0	0.3	250	250	−12.0	40.0	7.0	—	3.9	260	7,500	2.7	—	B7	24
KT35	(BT)	13.0	0.6†	200	200	−11.5	50.0	8.5	—	10.0	200	4,000	4.2	—	IO	73
KT31	(BT)	26.0	0.3	200	180	−4.0	40.0	10.6	—	10.0	80	5,500	2.5	—	B7	15
Replacement Types															
DL92/N17	(P)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	—	1.425	—	8,000	0.27	12	B7G	6
KT2	(BT)	2.0*	0.2	150	150	−4.5	7.5	1.7	—	2.5	—	17,000	0.5	—	B5	6
LP2	(T)	2.0*	0.2	100	—	−3.0	5.0	—	4,170	3.6	—	7,000	0.15	—	B4	1
P2	(T)	2.0*	0.2	100	—	−6.0	11.0	—	2,150	3.5	—	4,500	0.3	—	B4	1
DA30	(T)	4.0*	2.0	500	—	−144.0	60.0	—	—	3.85	—	6,000	11.0	5.5	B4	1
DN41	(P, DD)	4.0	2.3	250	200	−3.3	32.0	8.0	—	10.0	90	7,800	4.5	—	B7	9
KT41	(BT)	4.0	2.0	250	250	−4.4	40.0	8.5	—	10.5	90	6,000	4.2	8	B7	24
MKT4	(BT)	4.0	1.0	200	200	−10.5	32.0	4.0	—	3.0	365	8,000	2.5	10	B7	24

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
MARCONI (*Continued*)																
Replacement Types (Continued)																
PX25	(T)	4.0*	2.0	400	—	−31.0	62.5	—	1,265	7.5	1,000	5,500	6.0	7	B4	1
KT63	(BT)	6.3	0.7	250	250	−16.5	34.0	5.5	—	2.5	420	7,000	4.8	—	IO	36
KT76	(BT)	15.0	0.16	175	175	−12.5	33.0	6.0	—	2.5	300	5,000	2.0	4.5	IO	36
KT32	(BT)	26.0	0.3	110	110	−7.0	50.0	4.0	—	9.0	95	1,300	2.3	11	IO	36
KT71	(BT)	48.0	0.16	175	175	−9.8	70.0	12.0	—	10.0	120	2,500	5.0	9	IO	36
KT101	(BT)	80.0	0.1	175	175	−9.8	70.0	12.0	—	10.0	180	3,000	3.8	12	B8B	10
	(T)	80.0	0.1	175	—	−7.5	120.0	—	—	11.5	—	—	—	—	B8B	10
Current Types																
DL94/N19	(P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	58
DL96	(P)	1.4*	0.05	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
N18/3Q4	(P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	6
KT44/45	(BT)	4.0	2.0	250	250	−25.0	85.0	20.0	—	6.3	—	2,200	7.5	9	B7	37
PX4	(T)	4.0*	1.0	300	—	−45.0	50.0	—	830	6.0	1,000	3,500	4.5	4	B4	1
EBL21/DN143	(P, DD)	6.3	0.8	250	250	−6.0	36.0	4.5	70,000	9.0	120	5,700	4.5	10	B8B	62
ECL80/LN152	(TP)	6.3	0.3	200	200	−8.0	17.5	3.3	150,000	3.3	—	11,000	1.4	10	B9A	13
EL33/N147	(P)	6.3	0.9	250	250	−6.0	36.0	4.0	50,000	9.0	150	7,000	4.0	10	IO	36
EL41/N150	(P)	6.3	0.7	250	250	−7.0	36.0	5.2	40,000	10.0	—	7,000	4.2	10	B8A	23
EL42/N151	(P)	6.3	0.2	225	225	−11.0	26.0	4.1	90,000	3.2	360	9,000	2.5	10	B8A	23
EL84/N709	(P)	6.3	0.76	250	250	−7.3	48.0	—	38,000	11.3	120	5,000	6.0	10	B9A	16
KT61	(BT)	6.3	0.95	250	250	−4.4	40.0	7.5	—	10.5	90	6,000	4.3	8	IO	36
KT66	(BT)	6.3	1.27	250	250	−15.0	85.0	6.3	—	6.3	160	2,200	7.25	9	IO	36
N144	(P)	6.3	0.2	250	250	−13.8	16.0	2.4	130,000	2.6	680	16,000	1.4	10	B7G	63
N148/7C5	(BT)	6.3	0.45	250	250	−12.5	45.0	4.5	77,000	4.1	360	8,500	—	12	B8B	63
N155	(P)	6.3	0.2	225	225	−10.8	26.0	4.1	90,000	3.2	—	9,000	2.6	—	B9A	26
N727/6AQ5	(BT)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	240	5,000	4.5	8	B7G	27
HN309	(TP)	12.6	0.3	165	165	−9.0	30.0	6.5	45,000	4.7	220	6,000	—	10	B9A	27
PCL83/LN309	(TP)	12.6	0.3	200	200	−13.0	27.0	4.4	45,000	5.5	220	6,000	2.5	10	B9A	27
KT33C	(BT)	13.0	0.6†	175	175	−7.0	44.0	8.0	—	10.0	190	3,000	4.0	—	IO	73
N37	(P)	13.0	0.3	165	165	−9.0	53.0	9.0	23,200	9.5	330	6,000	4.1	10	B7G	25
PL83/N309	(P)	15.0	0.3	200	200	−3.5	36.0	5.0	41,000	10.0	68	5,000	1.1	7.8	B9A	14
PL82/N329	(P)	16.5	0.3	200	200	−14.2	45.0	8.5	20,000	7.6	180	3,000	4.2	10	B9A	16
N108	(P)	40.0	0.1	165	165	−9.0	53.0	9.0	23,200	9.5	150	3,000	4.1	10	B7G	25
N145	(P)	40.0	0.1	180	150	−6.3	29.0	5.8	—	7.5	180	5,800	2.6	10	B8A	7
UL41/N142	(P)	45.0	0.1	200	200	−14.2	45.0	8.5	20,000	8.2	140	3,000	4.2	10	B8A	23

‡ Maximum anode voltage, 8,000 peak.

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
MULLARD																
Obsolete Types																
DL66	(P)	1.25*	0.015	22.5	22.5	−1.4	0.3	0.075	300,000	0.35	—	75,000	0.0027	10	B5A	
DL71	(P)	1.25*	0.025	45	45	−1.25	0.6	0.15	350,000	0.55	—	100,000	0.0063	10	B8D†	6
DL72	(P)	1.25*	0.025	45	45	−4.5	1.25	0.4	170,000	0.55	2,700	30,000	0.02	10	B8D†	6
DL75	(P)	1.25*	0.025	90	90	−2.5	1.75	0.4	450,000	0.85	—	60,000	0.05	10	B8D†	6
DL2	(P)	1.4*	0.1	90	90	−7.5	7.5	1.6	115,000	1.55	—	8,000	0.24	10	Ct8	25
ACO42	(T)	2.0*	2.0	300	—	−38.0	50.0	—	1,200	5.0	760	2,300	3.5	5	B4	1
KL35	(P)	2.0*	0.15	135	135	−4.5	5.6	—	150,000	2.2	—	19,000	0.34	10	IO	78
PM2	(T)	2.0*	0.2	100	—	−7.0	4.0	—	7,000	0.9	—	9,000	—	—	B4	1
PM2A	(T)	2.0*	0.2	135	—	−6.0	5.0	—	6,000	2.0	—	7,000	0.15	5	B4	1
PM22	(P)	2.0*	0.2	150	150	−10.0	15.0	4.0	—	1.3	—	8,000	—	—	B5	6
PM22A/5	(P)	2.0*	0.15	135	135	−4.5	5.6	—	150,000	2.2	—	19,000	0.34	10	B5	6
PM22D	(P)	2.0*	0.3	135	135	−2.4	5.0	0.8	—	3.0	—	24,000	0.3	10	B5	6
PM202	(T)	2.0*	0.2	150	—	−15.0	14.0	—	2,000	3.5	—	3,700	—	—	B4	1
ACO44	(T)	4.0*	1.0	300	—	−38.0	50.0	—	1,200	5.0	760	2,300	3.5	5	B4	1
DO24	(T)	4.0*	1.85	400	—	−40.0	63.0	—	1,070	7.5	630	3,200	7.1	4	B4	1
DO26	(T)	4.0*	2.0	400	—	−92.0	63.0	—	950	3.8	1,500	3,000	7.5	10	B4	1
DO30	(T)	4.0*	2.0	500	—	−134.0	60.0	—	580	6.9	2,250	6,000	11.0	—	B4	1
Pen4VA	(P)	4.0	1.35	250	250	—	36.0	3.0	40,000	2.8	500	6,000	3.8	10	B5	7
															B7	24
Pen428	(P)	4.0	2.1	250	250	—	72.0	—	—	—	150	3,200	8.0	10	B7	24
PM24A	(P)	4.0*	0.275	300	200	−22.5	20.0	3.5	—	1.7	—	10,000	2.5	10	B5	6
PM24M	(P)	4.0*	1.1	250	250	−17.0	30.0	5.6	43,000	3.0	540	7,000	2.8	—	B5	6
6L6	(BT)	6.3	0.9	350	250	−18.0	54.0	2.5	33,000	5.2	330	4,200	10.8	15	IO	36
EBL1	(P, DD)	6.3	1.2	250	250	−6.0	36.0	5.0	55,000	9.5	146	7,000	4.3	10	Ct8	13
EC31	(T)	6.3	0.65	250	—	−16.0	20.0	—	3,300	3.2	800	10,000	0.5	5	IO	20
EL3	(P)	6.3	0.9	250	250	−6.0	36.0	4.0	50,000	9.0	150	7,000	4.0	10	Ct8	12
	(T)	6.3	0.9	250	—	−8.5	20.0	—	3,000	6.5	425	7,000	11.0	5	Ct8	12
EL6, EL36	(P)	6.3	1.2	250	250	−7.0	72.0	8.0	20,000	14.5	90	3,500	8.0	10	Ct8	12
															IO	36

† Flying Leads.

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base Type	Base Ref.
MULLARD (*Continued*)																
Obsolete Types (Continued)																
EL22	(P)	6.3	0.7	250	250	−7.0	44.0	5.2	45,000	9.5	140	5,750	5.2	10	B8B	10
EL31	(P)	6.3	1.4	275	275	−9.0	91.0	11.0	20,000	14.0	—	—	—	—	IO	40
EL35	(P)	6.3	1.35	250	250	−15.5	72.0	8.0	15,500	5.0	180	2,500	6.0	10	IO	36
EL50	(P)	6.3	1.35	250	275	−14.0	72.0	8.0	22,000	8.5	175	3,500	8.8	10	Ct8	21
Pen26	(P)	24.0	0.2	200	100	−19.0	40.0	5.0	—	3.1	420	5,000	3.0	10	Ct8	4
CL4	(P)	33.0	0.2	200	200	−8.5	45.0	6.0	35,000	8.0	167	4,500	4.0	10	Ct8	4
Pen36C	(P)	33.0	0.2	200	200	−8.5	45.0	6.0	35,000	8.0	167	4,500	4.0	10	B7	24
35L6	(P)	35.0	0.15	200	110	−8.0	44.0	7.0	40,000	5.9	185	4,500	3.3	10	IO	36
CL6	(P)	35.0	0.2	200	100	−9.5	45.0	5.5	19,000	8.0	190	4,500	4.0	10	Ct8	4
Pen40DD	(P, DD)	44.0	0.2	200	200	−8.5	45.0	6.0	35,000	8.0	170	4,500	4.0	10	B7	22
Replacement Types																
DL64	(P)	1.25*	0.01	15.0	15.0	−1.5	0.16	0.04	400,000	0.18	—	100,000	0.00095	10	B5A	3
DL68	(P)	1.25*	0.025	22.5	22.5	−2.2	0.6	0.15	100,000	0.43	—	37,000	0.005	10	B5A	1
1C5	(P)	1.4*	0.1	90	90	−7.5	7.8	3.5	115,000	1.55	—	8,000	0.24	10	IO	78
3Q5	(P)	1.4*	0.1†	110	110	−6.6	10.0	1.4	100,000	2.2	—	8,000	0.4	6	IO	87
DL33	(P)	1.4*	0.1†	90	90	−4.5	9.5	1.3	90,000	2.2	—	8,000	0.27	6	IO	87
DL35	(P)	1.4*	0.1	90	90	−7.5	7.5	1.6	115,000	1.55	—	8,000	0.24	10	IO	78
DL92	(P)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.57	—	8,000	0.27	12	B7G	6
DL93	(P)	1.4*	0.2†	150	90	−8.4	13.3	2.2	100,000	1.9	—	8,000	0.7	6	B7G	7
DL94	(P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	9
DL96	(P)	1.4*	0.05	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
Pen4DD	(P, DD)	4.0	2.25	250	250	−6.0	36.0	5.0	50,000	9.5	146	7,000	4.3	10	B7	22
PenA4	(P)	4.0*	1.95	250	250	−5.8	36.0	5.0	50,000	9.5	145	8,000	3.8	10	B7	24
PenB4	(P)	4.0	2.1	250	275	—	72.0	7.0	22,000	8.5	175	3,500	8.8	10	B7	24
6F6	(P)	6.3	0.7	285	285	−22.0	38.0	12.0	78,000	2.55	440	7,000	4.5	9	IO	36
6V6	(BT)	6.3	0.45	315	225	−13.0	35.0	6.0	77,000	3.75	315	8,500	5.5	12	IO	36
42	(P)	6.3	0.7	Other data as Type 6F6											UX6	8
EBL21	(P, DD)	6.3	0.8	250	275	−6.2	44.0	5.8	50,000	9.5	125	5,700	5.5	10	B8B	6
EBL31	(P, DD)	6.3	1.2	250	250	−6.0	36.0	5.0	55,000	9.5	146	7,000	4.3	10	IO	15
EL2	(P)	6.3	0.2	250	250	−18.0	32.0	5.0	70,000	2.8	485	8,000	3.6	10	Ct8	33
EL32	(P)	6.3	0.2	250	250	−18.0	32.0	5.0	70,000	2.8	485	8,000	3.6	10	IO	9
EL33	(P)	6.3	0.9	250	250	−6.0	36.0	4.0	50,000	9.0	150	7,000	4.0	10	IO	36
	(T)	6.3	0.9	250	—	−8.5	20.0	—	3,000	6.5	425	7,000	1.1	5		
EL37	(P)	6.3	1.4	250	250	−13.5	100.0	13.5	13,500	11.0	120	2,500	11.5	13.5	IO	36
EL41	(P)	6.3	0.7	250	250	−7.0	36.0	5.2	40,000	10.0	170	7,000	4.2	10	B8A	23
	(T)	6.3	0.7	250	—	—	33.0	—	—	—	250	3,500	1.55	8		
EL42	(P)	6.3	0.2	225	225	−10.0	26.0	4.1	90,000	3.2	360	9,000	2.5	10	B8A	23
PL82	(P)	16.5	0.3	170	170	−10.4	53.0	10.0	20,000	9.0	165	3,000	4.0	10	B9A	16
PL33	(P)	19.0	0.3	250	250	−6.0	36.0	4.0	50,000	9.0	150	7,000	4.5	10	IO	36
	(T)	19.0	0.3	250	—	−8.5	20.0	—	3,000	6.5	425	7,000	1.1	5		
25A6	(P)	25.0	0.3	160	120	−18.0	36.0	12.0	42,000	2.4	450	5,000	2.2	10	IO	36
25L6	(P)	25.0	0.3	200	110	−8.0	55.0	7.0	30,000	9.5	160	3,000	4.3	10	IO	36
43	(P)	25.0	0.3	Other data as Type 25A6											UX6	8
CL33	(P)	33.0	0.2	200	200	−8.5	45.0	6.0	35,000	8.0	167	4,500	4.0	10	IO	36
UCL83	(TP)	40.0	0.1	170	170	−9.5	30.0	5.0	53,000	5.5	—	5,500	2.2	10	B9A	27
CBL1	(P, DD)	44.0	0.2	200	200	−8.5	45.0	6.0	35,000	8.0	167	4,500	4.0	10	Ct8	13
CBL31	(P, DD)	44.0	0.2	200	200	−8.5	45.0	6.0	35,000	8.0	167	4,500	4.0	10	IO	15
UL41	(P)	45.0	0.1	170	170	−10.4	53.0	10.0	20,000	9.5	160	3,000	4.2	10	B8A	23
UL46	(P)	45.0	0.1	170	170	−10.4	53.0	10.0	20,000	9.5	—	3,000	4.2	10	B8A	7
50L6	(P)	50.0	0.15	200	110	−8.0	55.0	7.0	30,000	9.5	160	3,000	4.2	10	IO	36
UBL21	(P, DD)	55.0	0.1	220	200	−13.0	55.0	9.5	25,000	8.0	200	3,500	4.8	10	B8B	6
Current Types																
DL69	(P)	1.25*	0.025	90	90	−3.0	1.75	0.04	600,000	0.85	—	60,000	0.05	10	B5A	5
DL70	(P)	1.25*	0.11	135	90	−7.5	7.5	1.5	150,000	1.9	—	16,000	0.5	10	B8D†	6
DL73	(P)	1.25*	0.2	100	100	−9.0	15.0	3.8	16,000	2.5	—	—	—	—	B8D†	6
DL620	(P)	1.25*	0.05	67.5	67.5	−6.5	3.25	1.0	110,000	0.65	—	15,000	0.085	10	B5A	1
ECL80	(TP)	6.3	0.3	200	200	−8.0	17.5	3.3	150,000	3.3	—	11,000	1.4	10	B9A	13
ECL82	(TP)	6.3	0.78	250	250	−22.5	28.0	5.5	25,000	5.0	680	9,000	3.4	10	B9A	37
ECL83	(TP)	6.3	0.6	200	200	−13.3	27.0	4.4	65,000	5.0	—	75,000	2.5	10.5	B9A	27
EL34	(P)	6.3	1.5	250	250	−13.5	100.0	14.9	15,000	11.0	120	2,000	11.0	10	IO	133
EL71, 1902 (SQ)	(P)	6.3	0.45	110	110	−8.5	30.0	2.0	15,000	4.0	270	3,000	1.0	—	B8D†	14
EL83	(P)	6.3	0.71	250	250	−5.5	36.0	5.0	130,000	10.0	—	—	—	—	B9A	14
EL84	(P)	6.3	0.76	250	250	−7.3	48.0	5.5	38,000	11.3	135	5,200	5.7	10	B9A	16
EL85	(P)	6.3	0.2	225	225	−10.8	26.0	4.1	90,000	3.2	360	9,000	2.6	10	B9A	26
EL86	(P)	6.3	0.76	170	170	−12.5	70.0	5.0	23,000	10.0	—	24,000	5.6	10	B9A	16
EL90	(P)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	250	5,000	4.5	8	B7G	27
EL91, M8082 (SQ)	(P)	6.3	0.2	250	250	−13.8	16.0	2.4	130,000	2.6	740	16,000	1.4	10	B7G	25

† Flying Leads

(Continued)

Type	Heater		Volts			Current (mA)		r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen							Type	Ref.
MULLARD *(Continued)*															
Current Types (Continued)															
EL95 (P)	6.3	0.2	250	250	−9.0	24.0	4.5	80,000	5.0	320	10,000	3.0	12	B7G	67
EL821 (P)	6.3	0.75	250	250	−4.5	40.0	6.0	50,000	11.0	—	—	—	—	B9A	19
EL822 (P)	6.3	0.75	250	150	−2.5	40.0	5.0	100,000	13.0	—	—	—	—	B9A	19
PCL83 (TP)	12.6	0.3	170	170	−9.5	30.0	5.0	53,000	5.5	—	5,500	2.2	10	B9A	27
PCL84 (TP)	15.0	0.3	220	220	−3.4	18.0	3.1	150,000	10.0	—	—	—	—	B9A	53
PL83 (P)	15.0	0.3	170	170	−2.3	36.0	5.0	100,000	10.0	—	—	—	—	B9A	14
PL84 (P)	15.0	0.3	170	170	−12.5	70.0	3.5	26,000	11.0	—	—	—	—	B9A	16
PCL82 (TP)	16.0	0.3	170	170	−11.5	41.0	9.0	16,000	7.5	—	3,900	3.3	10	B9A	37
PCL85 (TP)	18.0	0.3	170	170	−15.0	41.0	2.7	25,000	7.25	—	—	—	—	B9A	66
UL84 (P)	45.0	0.1	170	170	−12.5	70.0	5.0	23,000	10.0	170	2,400	5.6	10	B9A	16
HL92 (P)	50.0	0.15	110	110	−7.5	49.0	4.0	10,000	7.5	—	2,500	1.9	9	B7G	42
TUNGSRAM															
Obsolete Types															
P215 (T)	2.0*	0.15	150	—	−12.0	12.0	—	3,300	1.5	—	7,000	0.26	—	B4	1
PP2 (P)	2.0*	0.14	135	135	−5.0	7.0	1.0	—	—	—	19,000	0.44	—	B4	7
														B5	6
PP215 (P)	2.0*	0.15	90	90	−4.5	8.0	1.2	—	—	—	14,000	0.2	—	B5	6
PP222 (P)	2.0*	0.22	150	150	−6.0	9.0	2.0	—	—	—	14,000	0.6	—	B4	7
														B5	7
PP225 (P)	2.0*	0.265	135	135	−12.0	18.0	2.0	—	—	—	6,000	0.8	—	B5	6
SP220 (T)	2.0*	0.2	150	—	−12.0	14.0	—	2,200	3.0	—	6,700	0.36	—	B4	1
APP4E (P)	4.0	2.0	375	275	−13.5	72.0	8.0	—	—	175	3,500	8.8	—	B7	25
APP4g, APP4g* (P)	4.0	2.0	250	250	−6.0	36.0	4.0	—	10.0	150	7,000	3.6	—	B7	5
														B7	15
O15/400 (T)	4.0*	1.0	500	—	−37.0	40.0	—	1,800	4.5	900	6,000	3.5	—	B4	1
P12/250 (T)	4.0*	1.0	250	—	−33.0	48.0	—	830	6.0	700	2,400	2.75	—	B4	1
P15/250 (T)	4.0*	1.0	250	—	−44.0	60.0	—	660	6.0	750	2,500	3.5	—	B4	1
PP4 (P)	4.0	1.1	250	250	−15.0	36.0	6.0	—	—	400	7,500	3.1	—	B5	6
EBL1 (P, DD)	6.3	1.4	250	250	−6.0	36.0	4.0	—	9.5	150	7,000	3.6	—	Ct8	13
EL2 (P)	6.3	0.2	250	250	−18.0	32.0	5.0	—	2.8	480	8,000	3.6	—	Ct8	4
EL3 (P)	6.3	1.2	250	250	−7.0	36.0	4.5	—	9.5	175	7,000	4.5	—	Ct8	12
EL5 (P)	6.3	1.2	250	275	−14.0	72.0	7.0	—	8.5	175	3,500	8.8	—	Ct8	12
EL6 (P)	6.3	1.4	250	250	−7.0	72.0	8.5	—	15.0	85	3,500	8.2	—	Ct8	12
EL36 (P)	6.3	1.4	250	250	−7.0	72.0	8.5	—	15.0	85	3,500	8.2	—	IO	36
EL42 (P)	6.3	0.2	225	225	−10.0	26.0	4.1	90,000	3.2	360	9,000	2.5	10	B8A	23
P2018 (T)	20.0	0.18	200	—	−15.0	20.0	—	—	4.0	750	5,000	0.9	—	B5	1
PP2018 (P)	20.0	0.18	200	200	−18.0	20.0	5.0	—	2.5	720	8,800	1.4	—	B5	7
PP24, PP24S (P)	24.0	0.2	200	100	−19.0	40.0	5.0	—	3.0	400	5,000	3.2	—	B7	15
														Ct8	4
PP34, PP34S (P)	35.0	0.2	200	200	−6.5	45.0	5.0	—	8.5	170	4,400	3.2	—	B7	15
														Ct8	4
PP36 (P)	35.0	0.2	200	200	−6.5	45.0	5.0	—	8.5	170	5,000	3.2	—	B7	25
PP37, CL6 (P)	35.0	0.2	200	100	−9.5	45.0	5.0	—	8.5	190	4,500	3.5	—	B7	15
														Ct8	4
Replacement Types															
1S4 (BT)	1.4*	0.1	90	67.5	−7.0	7.4	1.4	100,000	1.58	—	8,000	0.27	12	B7G	4
LP220 (T)	2.0*	0.2	150	—	−4.5	5.0	—	3,900	3.5	—	7,500	0.2	—	B4	1
2A5 (P)	2.5	1.75	250	250	−16.5	34.0	6.5	100,000	2.2	—	7,000	3.0	—	UX6	8
APP4A (P)	4.0	1.2	250	250	−16.5	36.0	6.0	—	—	400	7,000	3.5	—	B5	7
														B7	24
APP4B (P)	4.0	2.0	250	250	−5.0	36.0	4.0	—	—	140	7,000	3.6	—	B7	24
DDP4B, DDP4M (P, DD)	4.0	2.0	250	250	−5.0	36.0	4.0	—	8.0	150	7,000	3.6	—	B7	9
														B7	22
P27/500 (T)	4.0*	2.0	500	—	−31.0	62.5	—	1,050	8.5	500	5,000	5.0	—	B4	1
DDPP6B (DD)	6.3	1.4	250	250	−6.0	36.0	5.0	—	9.5	150	7,000	4.3	—	B7	9
DDPP39, DDPP39M (P, DD)	35.0	0.2	200	200	−8.0	45.0	6.0	—	8.5	170	4,400	3.2	—	B7	9
														B7	22
PP35 (P)	35.0	0.2	200	200	−6.5	45.0	5.0	—	8.5	170	4,400	3.2	—	B7	24
Current Types															
1C5GT (P)	1.4*	0.1	90	90	−7.5	7.5	1.6	115,000	1.55	—	8,000	0.24	10	IO	78
3A4 (P)	1.4*	0.2†	150	90	−8.4	13.3	2.2	100,000	1.9	—	8,000	0.7	6	B7G	7
3C4 (P)	1.4*	0.05	85	85	−5.2	5.0	0.9	150,000	1.4	—	13,000	0.2	10	B7G	9
3Q4 (P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	6
3Q5GT (P)	1.4*	0.1†	90	90	−4.5	9.5	1.3	90,000	2.2	—	8,000	0.27	6	IO	87
3S4 (P)	1.4*	0.1†	90	67.5	−7.0	7.4	1.4	100,000	1.57	—	8,000	0.27	12	B7G	6

(Continued)

Type	Heater		Volts			Current (mA)		r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen							Type	Ref.
TUNGSRAM *(Continued)*															
Current Types (Continued)															
3V4 (P)	1.4*	0.1†	90	90	−4.5	9.5	2.1	100,000	2.15	—	10,000	0.27	7	B7G	9
42 (P)	6.3	0.7	Other data as Type 6F6											UX6	8
807 (BT)	6.3	0.9	500	200	−14.5	50.0	1.6	39,000	5.7	280	6,000	11.5	12	UX5	6
6AB8 (TP)	6.3	0.3	200	200	−8.0	17.5	3.3	150,000	3.3	—	11,000	1.4	10	B9A	13
6AM5 (P)	6.3	0.2	250	250	−12.5	16.0	2.4	130,000	2.6	680	16,000	1.4	10	B7G	25
6AQ5 (P)	6.3	0.45	250	250	−12.5	45.0	4.5	52,000	4.1	250	5,000	4.5	8	B7G	27
6BQ5 (P)	6.3	0.76	250	250	−7.3	48.0	5.5	38,000	11.3	135	5,200	5.7	10	B9A	16
6C4 (T)	6.3	0.15	250	—	−8.5	10.5	—	7,700	2.2	—	—	—	—	B7G	15
6CK5 (P)	6.3	0.7	250	250	−7.0	36.0	5.2	40,000	10.0	170	7,000	4.2	10	B8A	23
(T)	6.3	0.7	250	—	—	33.0	—	—	—	250	3,500	1.55	8		
6F6 (P)	6.3	0.7	285	285	−22.0	38.0	12.0	78,000	2.55	440	7,000	4.5	9	IO	36
6L6 (BT)	6.3	0.9	300	200	−13.0	54.5	4.6	33,000	5.2	220	4,500	6.5	11	IO	36
6M6	6.3	1.2	250	250	−6.0	36.0	4.0	—	9.5	150	7,000	4.4	—	IO	36
6V6 (BT)	6.3	0.45	315	225	−13.0	35.0	6.0	77,000	3.75	315	8,500	5.5	12	IO	36
EBL31 (P, DD)	6.3	1.2	250	250	−6.0	36.0	5.0	—	9.5	150	7,000	4.3	—	IO	15
ECL82 (TP)	6.3	0.78	170	170	−11.5	41.0	7.5	16,000	7.5	—	3,900	3.3	10	B9A	37
ECL83 (TP)	6.3	0.6	200	200	−13.0	27.0	4.4	65,000	5.5	—	7,500	—	10.5	B9A	27
EL32 (P)	6.3	0.2	250	250	−18.0	32.0	5.0	70,000	2.8	485	8,000	3.6	10	IO	9
EL33 (P)	6.3	1.2	250	250	−6.0	36.0	5.0	—	9.5	150	7,000	4.4	—	IO	36
EL37 (P)	6.3	1.4	250	250	−13.5	100.0	13.5	13,500	11.0	120	2,500	10.5	10	IO	36
EL85 (P)	6.3	0.2	225	225	−10.8	26.0	4.1	90,000	3.2	360	9,000	2.6	10	B9A	26
EL95 (P)	6.3	0.2	250	250	−9.0	24.0	4.5	80,000	5.0	320	10,000	3.0	12	B79	67
PP60 (BT)	6.3	1.27	250	250	−15.0	85.0	6.3	—	6.3	160	2,200	7.25	9	IO	36
12A6 (BT)	12.6	0.15	250	250	−12.5	30.0	3.5	70,000	3.0	375	7,500	2.4	—	IO	36
PCL83 (TP)	12.6	0.3	170	170	−9.5	30.0	5.0	53,000	5.5	—	5,500	2.2	10	B9A	27
18 (P)	14.0	0.3	315	315	−22.0	42.0	8.0	75,000	2.65	—	7,000	5.0	—	UX6	8
15A6 (P)	15.0	0.3	170	170	−2.3	36.0	5.0	100,000	10.0	—	—	—	—	B9A	14
16A8 (TP)	16.0	0.3	170	170	−11.5	41.0	7.5	16,000	7.5	—	3,900	3.3	10	B9A	37
16A5 (P)	16.5	0.3	170	170	−10.4	53.0	10.0	20,000	9.0	165	3,000	4.0	10	B9A	16
PL33 (P)	19.0	0.3	250	250	−6.0	36.0	4.0	50,000	9.0	150	7,000	4.5	10	IO	36
(T)	19.0	0.3	250	—	−8.5	20.0	—	3,000	6.5	425	7,000	1.1	5		
25A6 (P)	25.0	0.3	160	120	−18.0	36.0	12.0	42,000	2.4	450	5,000	2.2	10	IO	36
25L6 (BT)	25.0	0.3	200	110	−8.0	55.0	7.0	30,000	9.5	160	3,000	4.3	10	IO	36
35L6 (BT)	35.0	0.15	200	110	−8.0	44.0	7.0	40,000	5.9	185	4,500	3.3	10	IO	36
CL33 (P)	35.0	0.2	200	200	−7.5	45.0	5.0	—	8.0	170	4,300	3.2	—	IO	36
CBL31 (P, DD)	39.0	0.2	200	200	−8.0	45.0	6.0	—	8.5	170	4,400	3.2	—	IO	15
UCL83 (TP)	40.0	0.1	170	170	−9.5	30.0	5.0	53,000	5.5	—	5,500	2.2	10	B9A	27
45A5 (P)	45.0	0.1	170	170	−10.4	53.0	10.0	20,000	9.5	140	3,000	4.2	10	B8A	7
UL46 (P)	45.0	0.1	170	170	−10.4	53.0	10.0	20,000	9.5	—	3,000	4.2	10	B8A	7
UL84 (P)	45.0	0.1	165	165	−12.0	73.0	4.5	20,000	10.5	—	2,400	5.6	10	B9A	16
50C5 (BT)	50.0	0.15	110	110	−7.5	49.0	4.0	14,000	7.5	—	3,000	1.9	—	B7G	42
50L6 (BT)	50.0	0.15	200	110	−8.0	55.0	7.0	30,000	9.5	160	3,000	4.3	10	IO	36
UCL82 (TP)	50.0	0.1	200	100	−16.0	35.0	7.0	25,000	6.4	—	5,600	—	—	B9A	37
AMERICAN															
Current Types															
1AC5 (P)	1.25*	0.04	67.5	67.5	−4.5	2.0	0.4	150,000	0.75	—	25,000	0.05	10	Wires	
1V5 (P)	1.25*	0.04	67.5	67.5	−4.5	2.0	0.04	150,000	0.75	—	25,000	0.05	—	Wires	
2E35 (P)	1.25*	0.03	22.5	22.5	0	0.27	0.07	—	0.39	—	—	0.001	—	Wires	
2E36	1.25*	0.03	45	45	−1.25	0.45	0.11	250,000	0.5	—	100,000	0.006	—	Wires	
1A5 (P)	1.4*	0.05	90	90	−4.5	4.0	1.1	300,000	0.85	—	25,000	0.115	7	IO	78
1B8 (SD, TP)	1.4*	0.1	90	90	−6.0	6.3	1.4	—	1.15	—	14,000	0.21	—	IO	92
1C5 (P)	1.4*	0.1	90	90	−7.5	7.8	3.5	115,000	1.55	—	8,000	0.24	10	IO	78
1D8 (SD, TP)	1.4*	0.1	90	90	−9.0	5.0	1.0	200,000	0.93	—	12,000	0.2	10	IO	92
1LA4 (P)	1.4*	0.05	90	90	−4.5	4.0	1.1	300,000	0.85	—	25,000	0.115	7	B8B	27
1LB4 (P)	1.4*	0.1	90	90	−9.0	5.0	1.0	200,000	0.93	—	12,000	0.2	10	B8B	27
1N6 (SD, P)	1.4*	0.05	90	90	−4.5	3.4	1.2	300,000	0.8	—	25,000	0.1	7	IO	84
1Q5 (BT)	1.4*	0.1	90	90	−4.5	9.5	1.3	75,000	2.2	—	8,000	0.27	6	IO	78
1S4 (BT)	1.4*	0.1	90	67.5	−7.0	7.4	1.4	100,000	1.58	—	8,000	0.27	12	B7G	4
1T5 (BT)	1.4*	0.05	90	90	−6.0	6.5	1.5	250,000	1.15	—	14,000	0.17	7.5	IO	78
3B5 (BT)	1.4*	0.1†	67.5	67.5	−7.0	8.0	0.6	100,000	1.65	—	5,000	0.2	—	IO	87
3C5 (P)	1.4*	0.1†	90	90	−9.0	6.0	1.4	—	1.55	—	8,000	0.24	—	IO	87
3LF4	1.4*	0.1†	90	90	−4.5	8.0	1.0	80,000	2.0	—	7,000	0.23	—	B8B	32
3Q5 (BT)	1.4*	0.1†	110	110	−6.6	10.0	1.4	100,000	2.2	—	8,000	0.4	6	IO	87
1F4, 1F5 (P)	2.0*	0.12	135	135	−4.5	8.0	2.4	200,000	1.7	—	16,000	0.31	5	UX5	3
														IO	78
1G5 (P)	2.0*	0.12	135	135	−13.5	9.7	3.6	160,000	1.55	—	9,000	0.55	11	IO	78
1J5 (P)	2.0*	0.12	135	135	−16.5	7.0	2.0	100,000	0.95	—	13,500	0.45	—	IO	78

(Continued)

Type	Heater		Volts			Current (mA)		r_a (Ω)	g_m (mA/V)	R_K (Ω)	R_L (Ω)	Power Output (W)	D (%)	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen							Type[1]	Ref.
AMERICAN (*Continued*)															
Current Types (Continued)															
2A3 (T)	2.5*	2.5	250	—	−45.0	60.0	—	800	5.25	750	2,500	3.5	5	UX4	1
3LE4 (P)	2.8*	0.05	90	90	−9.0	9.0	1.8	110,000	1.6	—	6,000	0.3	—	B8B	32
6A3, 6B4 (T)	6.3*	1.0	250	—	−45.0	60.0	—	800	5.25	750	2,400	3.2	5	UX4 / IO	1 / 81
6A4 (P)	6.3*	0.3	180	180	−12.0	22.0	3.9	45,500	2.2	465	8,000	1.4	9	UX5	3
6A5 (T)	6.3	1.0	250	—	−45.0	60.0	—	800	5.25	750	2,500	3.75	—	IO	35
6AB6	6.3	0.5	250	—	0	34.0	—	40,000	1.8	—	8,000	3.5	—	IO	23
6AC5 (T)	6.3	0.4	250	—	—	—	—	36,000	3.4	—	7,000	3.7	—	IO	20
6AC6	6.3	1.1	180	—	0	45.0	—	—	3.0	—	4,000	3.8	—	IO	23
6AD7 (TP)	6.3	0.85	250	250	−16.5	36.0	10.5	80,000	2.5	—	7,000	3.2	—	IO	42
6AG7 (P)	6.3	0.65	300	150	−3.0	30.0	7.0	130,000	11.0	—	10,000	3.0	7	IO	11
6AH5 (BT)	6.3	0.9	350	250	−18.0	—	—	33,000	5.2	—	4,200	10.8	—	IO	104
6AL6 (BT)	6.3	0.9	250	250	−14.0	72.0	5.0	22,500	6.0	180	2,500	6.5	—	IO	38
6AN5 (P)	6.3	0.5	120	120	−6.0	35.0	12.0	12,500	8.0	—	—	—	—	B7G	14
6AR5 (P)	6.3	0.4	250	250	−16.5	35.0	5.5	65,000	2.4	—	7,000	3.2	—	B7G	41
6AR6 (BT)	6.3	1.2	250	250	−22.5	77.0	5.0	21,000	5.4	275	—	—	—	IO	37
6AS5 (BT)	6.3	0.8	150	110	−8.5	36.0	6.5	—	5.6	—	4,500	2.2	—	B7G	42
6AS7 (DT)	6.3	2.5	135	—	−31.5	125.0	—	280	7.5	250	—	—	—	IO	26
6AU5 (P)	6.3	1.25	450	175	−50.0	85.0	—	—	6.0	—	—	—	—	IO	140
6B5, 6N6 (DT)	6.3	0.8	300	—	0	42.0	—	24,000	2.4	—	7,000	4.0	5	UX6 / IO	5 / 23
6G6 (P)	6.3	0.15	180	180	−9.0	15.0	2.5	175,000	2.3	540	10,000	1.1	10	IO	36
6K6 (P)	6.3	0.4	315	250	−21.0	28.0	9.0	75,000	2.1	570	9,000	4.5	15	IO	36
6U6	6.3	0.75	250	135	−14.0	56.0	3.0	20,000	6.2	240	3,000	5.5	—	IO	36
6W6 (BT)	6.3	1.25	135	135	−9.5	61.0	12.0	—	9.0	130	2,000	3.3	—	IO	36
7A5 (BT)	6.3	0.75	125	125	−9.0	45.0	9.5	17,000	6.0	165	2,700	2.2	10	B8B	10
7Q5 (BT)	6.3	0.4	315	250	−21.0	28.0	9.0	75,000	2.1	570	9,000	4.5	15	B8B	10
12A5 (P)	6.3*	0.6†	180	180	−25.0	48.0	14.0	35,000	2.4	400	3,300	3.4	11	UX7	7
12A7 (P, R)	12.6	0.3	135	135	−13.5	9.0	2.5	100,000	0.98	1,200	13,500	0.55	—	UX7	3
12L8 (DP)	12.6	0.15	180	180	−9.0	13.5	4.6	160,000	2.5	—	10,000	1.0	—	IO	41
14A5 (BT)	12.6	0.15	250	250	−12.5	30.0	3.5	70,000	3.0	375	7,500	2.8	—	B8B	10
14C5 (BT)	12.6	0.22	Other data as Type 6V6											B8B	10
25A7 (P, R)	25.0	0.3	100	100	−15.0	20.5	4.0	50,000	1.8	615	4,500	0.77	9	IO	99
25AC5 (T)	25.0	0.3	165	For use with direct-coupled 6AF5 driver							3,500	3.3	—	IO	20
25B5, 25N6	25.0	0.3	180	—	0	46.0	—	15,000	2.3	—	4,000	3.8	9	UX6 / IO	5 / 23
25B6 (P)	25.0	0.3	200	135	−23.0	71.0	13.0	18,000	5.0	275	2,500	7.1	15	IO	36
25C6 (BT)	25.0	0.3	200	135	−14.0	66.0	9.0	18,300	7.1	186	2,600	6.0	10	IO	36
26A7 (DBT)	26.5	0.6	26.5	26.5	−4.5	20.0	2.0	2,500	5.5	—	1,500	0.2	—	IO	41
28D7 (DBT)	28.0	0.4	28	28	—	9.0	0.7	—	—	—	4,000	0.08	—	B8B	38
32L7 (BT, R)	32.5	0.3	90	90	−7.0	27.0	8.0	17,000	4.8	200	2,600	1.0	9	IO	99
35B5 (BT)	35.0	0.15	110	110	−7.5	41.0	7.0	—	5.8	185	2,500	1.5	10	B7G	27
35C5 (BT)	35.0	0.15	110	110	−7.5	41.0	7.0	—	5.8	—	2,500	1.5	—	B7G	42
50B5 (BT)	50.0	0.15	110	110	−7.5	49.0	4.0	14,000	7.5	140	2,500	1.9	9	B7G	27
50C6 (BT)	50.0	0.15	135	135	−13.5	58.0	3.5	9,300	7.0	220	2,000	3.6	—	IO	36
70A7 (BT, R)	70.0	0.15	110	110	−7.5	40.0	3.0	—	5.8	175	2,500	1.5	—	IO	105
70L7 (BT, R)	70.0	0.15	110	110	−7.5	43.0	6.0	15,000	7.5	150	2,000	1.8	10	IO	43
117L7, 117M7 (BT, R)	117.0	0.09	105	105	−5.2	43.0	5.5	17,000	5.3	110	4,000	0.85	5	IO	44
117N7 (BT, R)	117.0	0.09	100	100	−6.0	51.0	5.0	16,000	7.0	110	3,000	1.2	6	IO	45
117P7 (BT, R)	117.0	0.09	105	105	−5.2	43.0	5.5	17,000	5.3	110	4,000	0.85	5	IO	45

OUTPUT VALVES 2

(Push-pull operation)

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	R_L a—a (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
BRIMAR																
Obsolete Types																
1S4 (BT)	—	—	Data as Type 3S4													
3Q4 (BT)	—	—	Data as Type 3V4													
3S4 (BT)	—	—	90	90	−16.5	2.0–8.4	0.35–2.7	32.5	—	—	10,000	—	6.0	AB_1	—	—
19 (DT)	2.0†	0.26	135	—	0	10–27	—	—	10,000	—	—	2.1	—	B	UX6	7
2A3 (T)	—	—	300	—	−62.0	40.0–74	—	124	∞	—	3,000	15.0	2.5	AB_1	—	—
41/41E (P)	—	—	285	285	—	27.5–31	4.5–6.5	51.0	—	400	12,000	9.8	4.0	A_1	—	—

(Continued)

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	R_L a—a (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
BRIMAR (*Continued*)																
Obsolete Types (Continued)																
6A3 (T)	—	—	Data as Type 2A3													
42 (P)	—	—	Data as Type 6F6													
7A2 (P)	—	—	Data as Type 6F6													
6B4 (T)	—	—	Data as Type 2A3													
6F6 (P)	—	—	315	285	—	31.0	9.0	58.0	∞	320	10,000	10.5	3.0	A_1	—	—
6K6 (P)	—	—	285	285	—	27.5–31	4.5–6.5	51.0	∞	400	12,000	9.8	4.0	A_1	—	—
79 (DT)	6.3	0.6	250	—	—	10.6	—	—	—	—	14,000	8.0	—	B	UX6	6
6N7 (DT)	6.3	0.8	300	—	0	35.0	—	82.0	1,032	—	8,000	10.0	8.0	B	IO	22
7C5 (BT)	—	—	Data as Type 6V6													
7D5 (P)	—	—	Data as Type 6F6													
807 (BT)	—	—	500	300	—	50–60	1.25–8.3	72.0	∞	270	9,000	32.5	2.7	A_1		
807 (T)	—	—	600	300	−29.5	40–75	0.75–8.8	59.0	∞	—	10,000	47.5	2.2	A_1	—	—
			600	300	−30.0	30–100	2.5–10.5	78.0	—	—	6,400	80.0	3.5	AB_2		
			325	—	—	40–42	—	60.0	∞	375	8,000	6.0	0.6	A	—	—
			400	—	−45.0	30–70	—	90.0	∞	—	3,000	15.0	3.0	AB_1		
18 (P)	—	—	Data as Type 6F6													
2151	—	—	250	250	−31.0	47.0	11.5	—	—	250	7,000	12.0	—	A	—	—
Replacement Types																
3V4 (BT)	—	—	90	90	−9.4	2.0–6.4	0.5–2.3	20.0	—	—	14,000	0.58	3.8	AB_1	—	—
DL96/3C4 (P)	—	—	81.5	81.5	−8.5	1.0–5.0	0.2–1.3	22.4	—	—	16,000	0.44	2.6	B	—	—
6AM5 (P)	—	—	250	250	—	13.0	4.1	30.0	∞	600	24,000	4.0	3.2	A	—	—
6CD6 (BT)	—	—	200	110	−14.0	80.0	5.8	28.0	∞	90	3,000	13.5	1.75	A_1	—	—
6CD6 (T)	—	—	200	—	−33.5	70.0	—	62.0	∞	240	1,500	4.8	2.7	A_1	—	—
6L6 (BT)	—	—	270	270	—	72.5	8.5	40.0	∞	125	5,000	18.5	4.0	A_1	—	—
			360	270	—	50.0	9.5	57.0	∞	250	9,000	24.0	4.0	AB_1	—	—
			360	270	−22.5	69.0	8.0	45.0	—	—	6,600	26.5	1.8	AB_2	—	—
6L6 (T)	—	—	325	—	—	42.0	—	60.0	∞	375	8,000	6.0	0.6	A_1	—	—
6V6 (BT)	—	—	285	285	−19.0	35–46	2.0–6.8	38.0	∞	250	8,000	14.0	3.5	AB_1	—	—
9BW6 (BT)	—	—	Data as Type 6BW6													
EL41 (P)	—	—	300	300	—	36.0	9.5	24.0	—	140	9,000	13.0	2.5	AB_1	—	—
UL41 (P)	—	—	200	200	—	45–53	9.0–19	35.0	∞	130	4,000	12.5	—	—	—	—
19AQ5 (BT)	—	—	Data as Type 6AQ5													
50C5 (BT)	—	—	110	110	−7.5	49.0	4.0	15.0	∞	70	4,000	3.75	7.0	A_1	—	—
50C5 (T)	—	—	110	—	−7.5	53.0	—	15.0	∞	70	2,000	0.75	2.1	A_1	—	—
50CD6 (BT)	—	—	Data as Type 6CD6													
Current Types																
5763 (BT)	—	—	300	225	—	43.0	7.3	13.75	∞	68	11,500	7.5	4.2	A_1	—	—
			300	225	—	28.5	7.3	21.0	∞	150	13,500	8.8	4.4	AB_1	—	—
			300	225	−12.5	70.0	9.0	71.0	—	—	4,500	25.0	9.6	AB_2	—	—
6AK6 (P)	—	—	180	180	—	14.5	3.8	18.0	∞	260	20,000	2.5	5.3	A_1	—	—
			275	225	−21.0	15.7	4.0	42.0	∞	—	20,000	5.2	4.2	AB_1	—	—
6AQ5 (BT)	—	—	250	250	−15.0	35–40	2.5	30.0	∞	—	10,000	10.0	3.0	AB_1	—	—
6BW6 (BT)	—	—	250	250	—	49.0	6.8	26.0	∞	120	10,000	9.0	2.5	A_1	—	—
			285	285	—	39.3	5.0	45.0	∞	260	8,000	12.0	1.0	AB_1	—	—
			315	285	−19.0	77.5	8.0	80.0	—	—	5,000	30.0	7.0	AB_2	—	—
6BW6 (T)	—	—	285	—	—	41.4	—	38.0	∞	240	4,500	3.1	0.5	A_1	—	—
6CH6 (BT)	—	—	250	250	—	40.0	8.8	9.0	∞	50	9,000	8.0	7.5	A_1	—	—
6CH6 (T)	—	—	250	—	—	46.0	—	9.0	∞	50	5,000	1.8	1.0	A_1	—	—
13D3 (DT)	6.3	0.6†	250	—	—	21.6	—	45.3	—	—	20,000	6.7	11.5	B	B9A	1
EL84/6BQ5 (P)	—	—	300	300	—	36.0	4.0	28.0	∞	130	8,000	17.0	10.0	AB_1	—	—
ECL82/6BM8 (TP)	—	—	200	200	—	39.5	16.5	35.0	∞	380	6,000	9.8	4.0	AB_1	—	—
ELL80 (DP)	6.3	0.55	250	250	—	21.0	4.2	22.6	—	180§	11,000	8.5	5.0	AB_1	B9A	68
PCL82 (TP)	Data as Type ECL82															

§ Common resistor.

COSSOR

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	R_L a—a (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
Obsolete Types																
220B (DT)	2.0*	0.2	120	—	0	6.0	—	—	3,000	—	12,000	1.1	—	B_2	B7	10
240B (DT)	2.0*	0.4	120	—	0	8.5	—	—	2,500	—	8,000	2.0	—	B_2	B7	10
240QP (DP)	2.0*	0.4	150	150	−12.0	6.0	—	—	∞	—	24,000	1.25	—	B_1	B7	11
6L6 (BT)	—	—	270	270	—	67.0	5.5	40.0	∞	250	5,000	18.5	2.0	A	—	—
			360	270	—	44.0	2.5	57.0	∞	500	9,000	24.0	4.0	AB_1	—	—
			360	270	−22.5	44.0	2.5	72.0	—	—	3,800	47.0	2.0	AB_2	—	—
Replacement Type																
6V6 (BT)	—	—	285	285	−19.0	35.0	2.0	38.0	∞	500	8,000	14.0	3.5	AB_1	—	—

(Continued)

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	R_L a—a (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
COSSOR (*Continued*)																
Current Types																
DL96 (P)	—	—	81.5	81.5	−8.5	1.0	0.2	20.0	—	—	16,000	0.44	2.2	B	—	—
807 (BT)	—	—	400	300	−25.0	100–165	5–10	48.0	—	—	8,400	45.0	—	AB_1	—	—
			600	300	−30.0	66–150	5–10	58.0	—	—	12,000	65.0	—	AB_1	—	—
EL84/6BQ5 (P)	—	—	300	300	—	46.0	11.0	28.0	—	130§	8,000	17.0	4.0	AB	—	—
PCL82 (TP)	—	—	200	200	—	35.0	7.0	25.0	—	190	6,000	9.8	4.0	AB	—	—
UCL82 (TP)	—	—	200	200	—	35.0	7.0	25.0	—	190	6,000	9.8	4.0	AB	—	—
										§ Common						
EDISWAN MAZDA																
Obsolete Types																
PD220 (DT)	2.0*	0.2	150	—	−1.15	0.4	—	58.0	3,300	—	11,500	2.85	5.0	B_2	B7	10
PD220A (DT)	2.0*	0.2	150	—	−6.0	1.25	—	74.0	7,000	—	10,000	2.9	5.0	B_2	B7	10
QP25 (DP)	2.0*	0.2	120	120	−9.75	2.3	0.43	19.5	∞	—	15,500	1.2	5.0	B_1	MO	9
QP230 (DP)	2.0*	0.3	120	120	−9.6	2.3	0.6	19.0	∞	—	17,000	0.85	5.0	B_1	B7	11
QP240 (DP)	2.0*	0.45	150	130.5	−11.5	2.0	0.45	23.0	∞	—	15,000	2.25	5.0	B_1	B9	4
PA40 (T)	4.0*	2.0ψ	450	—	−96.5	107.0	—	192.0	∞	—	4,000	40.0	5.0	AB_1	B4	1
Pen44 (BT)	—	—	300	275	−12.2	77.0	25.0	23.0	∞	—	5,000	24.0	5.0	AB_1	—	—
Pen45 (BT)	—	—	250	250	—	41.5	12.5	19.0	∞	180	7,500	11.5	5.0	AB_1	—	—
V503 (T)	4.0*	2.0ψ	450	—	−96.5	107.0	—	192.0	∞	—	4,000	40.0	5.0	AB_1	B4	1
11E1 (BT)	6.3	1.2ψ	450	250	−25.0	101.0	10.5	50.0	∞	—	5,000	52.0	3.0	AB_1	MO	20
Replacement Types																
6P25 (BT)	—	—	250	250	—	41.5	12.5	19.0	∞	180	7,500	11.5	5.0	AB_1	—	—
10P13 (BT)	—	—	180	185	—	30.0	13.0	22.0	∞	270	7,000	7.0	3.0	AB_1	—	—
10P13 (T)	—	—	220	—	—	30.0	—	27.0	∞	470	4,500	3.4	3.0	A	—	—
10P14 (BT)	—	—	195	210	—	48.0	26.5	26.0	∞	180	6,000	10.7	4.0	AB_1	—	—
			200	210	—	34.0	22.5	36.0	∞	330	7,000	10.0	3.0	AB_1	—	—
10P14 (T)	—	—	250	—	—	45.0	—	36.0	∞	430	4,000	5.9	3.0	—	—	—
20P3 (BT)	—	—	195	210	—	48.0	26.5	26.0	∞	180	6,000	10.7	4.0	AB_1	—	—
			200	210	—	34.0	22.5	36.0	∞	330	7,000	10.0	3.0	AB_1	—	—
20P3 (T)	—	—	250	—	—	45.0	—	36.0	∞	430	4,000	5.9	3.0	A	—	—
Current Types																
1P1	—	—	81.5	81.5	−8.5	1.0	0.18	22.0	∞	—	16,000	0.44	2.6	B	—	—
6P15 (P)	—	—	250	250	—	37.5	7.5	22.5	∞	260	8,000	11.0	3.0	AB_1	—	—
12E13 (T)	6.3	1.8ψ	425	—	—	90.0	—	100.0	—	525	4,000	27.0	1.3	A	IO	36
30PL12 (TP)	—	—	200	200	—	39.5	16.5	3.5	—	190	6,000	9.8	4.0	AB	—	—
30P16 (P)	—	—	170	170	—	49.0	16.5	26.0	∞	200	4,000	9.0	4.0	AB_1	—	—
			ψ Filament current per valve.													
EMITRON																
Current Types																
6AQ5 (BT)	—	—	250	250	−15.0	35.0	2.5	30.0	∞	—	10,000	10.0	3.0	AB_1	—	—
6L6G (BT)	—	—	270	270	—	67.0	5.5	40.0	∞	250	5,000	18.5	2.0	A	—	—
			360	270	—	44.0	2.5	57.0	∞	500	9,000	24.5	4.0	AB_1	—	—
			360	270	−22.5	44.0	2.5	72.0	—	—	3,800	47.0	2.0	AB_2	—	—
7C5 (BT)	—	—	285	285	−19.0	35.0	2.0	38.0	∞	—	8,000	14.0	3.5	AB_1	—	—
FERRANTI																
Obsolete Types																
QPT2 (DP)	2.0*	0.4	150	150	−9.0	3.3	0.9	—	∞	—	25,000	1.2	—	B_1	B7	11
LP4 (T)	—	—	300	—	−50.0	50.0	—	110.0	∞	500	3,800	13.5	2.5	AB_1	—	—
Replacement Types																
6F6 (P)	—	—	375	250	−26.0	32.0	2.5	82.0	∞	—	10,000	18.5	3.5	AB_2	—	—
			315	285	—	31.0	6.0	58.0	∞	320	10,000	10.5	3.0	A_1	—	—
6K6 (P)	—	—	285	285	—	27.5	4.5	51.0	∞	400	12,000	9.8	4.0	A_1	—	—
			270	270	—	67.5	5.5	40.0	∞	125	5,000	18.5	2.0	A_1	—	—
6L6 (BT)	—	—	360	270	—	44.0	2.5	57.0	∞	250	9,000	24.0	4.0	AB_1	—	—
			360	270	−22.5	44.0	2.5	72.0	—	—	3,800	47.0	2.0	AB_2	—	—
6V6 (BT)	—	—	282	285	−19.0	35.0	2.0	38.0	∞	—	8,000	14.0	3.5	AB_1	—	—
42 (P)							Data as Type 6F6								UX6	8
EL41/6CK5 (P)	—	—	300	300	—	36.0	9.5	24.0	—	140	9,000	13.0	2.5	AB_1	—	—
EL41/6CK5 (T)	—	—	300	—	—	33.0	—	9.4	—	150	10,000	4.0	1.0	AB_1	—	—
EL42 (P)	—	—	250	250	—	21.5	6.7	35.0	—	310	15,000	7.0	5.5	AB_1	—	—
EL90/6AQ5 (P)	—	—	250	250	—	35.0	2.5	30.0	—	200	10,000	10.0	3.0	AB_1	—	—
EL91/6AM5 (P)	—	—	250	250	—	11.0	1.6	34.0	∞	600	24,000	4.0	3.2	AB_1	—	—
UL41 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—
Current Types																
3S4/DL92 (P)	—	—	90	90	−16.5	8.4	2.7	32.0	—	—	10,000	0.78	6.0	AB_1	—	—
3V4/DL94 (P)	—	—	90	90	−9.4	6.4	2.3	20.0	—	—	14,000	0.58	3.8	AB_1	—	—
DL96/3C4 (P)	—	—	81.5	81.5	−8.5	4.5	1.1	20.0	—	—	16,000	0.44	2.2	B	—	—
			90	90	—	4.25	1.25	20.0	—	560	20,000	0.42	4.0	AB_1	—	—

(Continued)

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	R_L a—a (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
FERRANTI (*Continued*)																
Current Types (*Continued*)																
EL84/6BQ5 (P)	—	—	300	300	—	46.0	11.0	28.0	—	130	8,000	17.0	4.0	AB_1	—	—
EL84/6BQ5 (T)	—	—	—	—	—	36.0	—	28.0	—	270	10,000	5.3	2.5	AB_1	—	—
PCL83 (TP)	12.6	0.3	200	200	—	29.0	8.5	23.5	—	220	7,500	2.5	10.0	AB	—	—
PL84 (P)	15.0	0.3	170	170	—	57.0	20.0	13.1	—	120	3,500	13.0	4.5	AB	—	—
PL81/21A6 (P)	—	—	200	200	−31.5	87.0	12.5	31.0	—	—	2,500	20.0	5.5	B	—	—
PL82/16A5 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—
UL84 (P)	—	—	170	170	−17.0	57.5	20.5	18.5	—	120	3,500	13.0	4.5	AB_1	—	—
G.E.C.																
Obsolete Types																
N15 (P)	—	—	90	90	−11.0	6.0	2.3	17.0	∞	2,200	16,000	0.56	6.0	B_1	—	—
QP21 (DP)	2.0*	0.4	150	150	−9.0	12.6	6.0	—	∞	—	25,000	1.0	—	B_1	B7	11
KT35 (BT)	—	—	200	200	−14.7	58.5	15.0	14.7	∞	100	4,000	14.0	5.6	AB_1	—	—
KT71 (BT)	—	—	175	175	−10.2	72.5	15.0	28.0	∞	140	2,500	11.5	4.5	AB_1	—	—
Replacement Types																
N14 (P)	—	—	90	90	−11.0	6.0	2.4	17.0	∞	2,200	16,000	0.56	6.0	AB_1	—	—
PX4 (T)	—	—	300	—	−50.0	50.0	—	110.0	∞	1,000	4,000	13.5	2.5	AB_1	—	—
PX25 (T)	—	—	500	—	−50.0	50.0	—	102.0	∞	1,000	10,000	20.0	2.0	A	—	—
			500	—	−54.0	82.5	—	108.0	∞	—	3,400	26.0	4.0	AB_1	—	—
A2134 (P)	—	—	250	165	—	40.0	12.0	30.0	—	300	7,500	13.3	4.5	AB_1	—	—
A2134 (T)	—	—	165	—	−10.5	32.5	—	24.0	—	330	3,000	2.6	1.4	AB_1	—	—
EL84/N709 (P)	—	—	250	250	—	31.0	3.5	22.5	—	260	8,000	11.0	3.0	AB_1	—	—
EL90/N727 (BT)	—	—	250	250	−15.0	35.0	2.5	30.0	—	—	10,000	10.0	3.0	AB_1	—	—
KT61 (BT)	—	—	275	275	−6.7	36.0	6.0	16.0	∞	80	10,000	11.5	6.5	AB_1	—	—
KT63 (BT)	—	—	250	250	−20.0	32.0	7.0	39.0	∞	250	12,000	6.0	4.0	AB_1	—	—
KT81 (BT)	—	—	275	275	−8.7	38.0	10.0	17.5	∞	80	10,000	11.5	6.5	AB_1	—	—
KT81 (T)	—	—	350	—	—	36.5	—	23.0	∞	150	6,000	6.0	2.0	AB_1	—	—
N78 (P)	6.3	—	250	250	−5.0	35.0	5.5	11.2	—	120	9,000	9.0	4.6	AB_1	[illegible]7G	—
N78 (T)	6.3	—	350	—	−9.5	28.5	—	21.0	—	330	8,000	6.3	1.6	AB_1	[illegible]7G	—
DA41 (T)	7.5*	3.1ψ	1,000	—	0	140.0	—	220.0	—	—	7,000	175.0	5.0	B	UX4	20
PCL83/LN309 (TP)	—	—	165	165	—	28.0	6.0	28.0	—	220	6,000	5.2	2.3	AB_1	—	—
KT33C (BT)	—	—	200	200	−19.1	56.5	9.0	44.0	∞	240	4,000	15.5	7.5	AB_1	—	—
KT76 (BT)	—	—	175	175	−18.0	25.0	7.5	41.0	∞	350	8,000	4.8	3.0	AB_1	—	—
PL82/N329 (P)	—	—	170	170	—	49.0	16.5	26.0	—	200	4,000	9.0	4.0	AB_1	—	—
KT32 (BT)	—	—	135	135	−10.0	50.0	4.0	19.7	∞	200	2,500	7.5	5.0	AB_1	—	—
KT55 (BT)	52	0.3ψ	190	190	−25.0	112.5	22.5	28.8	—	185	2,000	25.0	—	AB_1	IO	36
KT55 (T)	—	—	200	—	−22.0	120.0	—	21.0	—	185	1,500	15.0	—	AB_1	IO	36
KT101 (BT)	—	—	175	175	−10.5	59.0	11.0	28.0	∞	140	2,500	11.5	4.5	AB_1	—	—
Current Types																
KT66 (BT)	—	—	400	400	−35.0	62.5	*	80.0	∞	560	7,000	32.0	2.0	UL.AB_1	—	—
KT66 (T)	—	—	500	500	−60.0	80.0	*	130.0	∞	—	8,000	50.0	2.0	UL.AB_1	—	—
KT77 (BT)	6.3	1.4ψ	400	—	−38.0	62.5	—	80.0	∞	600	4,000	14.5	3.5	AB_1	—	—
KT77 (T)	—	—	600	600	−28.0	60/77	62.0	23.0	11.5	470	6,000	30.6	2.5	UL	IO	—
KT88 (BT)	—	—	430	—	−27.0	60/66	60.0	85.0	3.8	440	5,000	17.6	1.2	AB_1	IO	—
KT88 (T)	—	—	425	425	−44.0	83.0	*	110.0	—	525	6,000	50.0	2.0	UL.AB_1	—	—
TT21	6.3	1.6ψ	550	550	−80.0	150.0	*	160.0	—	—	4,500	100.0	3.6	UL.AB_1	—	—
DA42 (T)	7.5	1.2ψ	425	—	—	90.0	—	100.0	—	525	4,000	27.0	1.3	A	—	—
TT22	12.6	0.8ψ	1,250	300	−4.0	120.0	—	200.0	—	—	13,000	200.0	6.0	B	4-pin	
			1,250	300	−45.0	28/130	71.0	12.0	11.0	—	15,000	200.0	7.0	AB_1	—	—
			ψ Per valve of pair.					* Included under anode current.								
HIVAC																
Obsolete Types																
B230 (DT)	2.0*	0.3	150	—	0	5.5	—	—	4,000	—	14,500	1.25	—	B_2	B7	10
QP240 (DP)	2.0*	0.4	150	150	−18.0	14.0	—	—	∞	—	14,500	1.4	—	B_1	B7	11
MARCONI																
Obsolete Types																
N14 (P)	—	—	90	90	−11.0	6.0	2.4	17.0	∞	2,200	16,000	0.56	6.0	AB_1	—	—
N15 (P)	—	—	90	90	−11.0	6.0	2.3	17.0	∞	2,200	16,000	0.56	6.0	B_1	—	—
KT81 (BT)	—	—	275	275	− 8.7	38.0	10.0	17.5	∞	80	10,000	11.5	6.5	AB_1	—	—
KT81 (T)	—	—	350	—	—	36.5	—	23.0	∞	150	6,000	6.0	2.0	AB_1	—	—
KT35 (BT)	—	—	200	200	−14.7	58.5	15.0	14.7	∞	100	4,000	14.0	5.6	AB_1	—	—

(Continued)

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	$R_{L\ a-a}$ (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
MARCONI (*Continued*)																
Replacement Types																
QP21 (DP)	2.0*	0.4	150	120	−4.5	5.6	1.4	—	∞	—	25,000	0.5	—	B_1	B7	11
PX25 (T)	—	—	500	—	−50.0	50.0	—	102.0	∞	1,000	10,000	20.0	2.0	A	—	—
			500	—	−54.0	82.5	—	108.0	∞	—	3,400	26.0	4.0	AB_1	—	—
KT63 (BT)	—	—	250	250	−20.0	32.0	7.0	39.0	∞	250	12,000	6.0	4.0	AB_1	—	—
KT76 (BT)	—	—	175	175	−18.0	25.0	7.5	41.0	∞	350	8,000	4.8	3.0	AB_1	—	—
KT32 (BT)	—	—	135	135	−10.0	50.0	4.0	19.7	∞	200	2,500	7.5	5.0	AB_1	—	—
KT71 (BT)	—	—	175	175	−10.2	72.5	15.0	28.0	∞	140	2,500	11.5	4.5	AB_1	—	—
KT101 (BT)	—	—	175	175	−10.5	59.0	11.0	28.0	∞	140	2,500	11.5	4.5	AB_1	—	—
Current Types																
PX4 (T)	—	—	300	—	−15.0	45.0	—	110.0	∞	1,000	4,000	13.5	2.5	AB_1	—	—
EL84/N709 (P)	—	—	250	250	—	31.0	3.5	22.5	—	260	8,000	11.0	3.0	AB_1	—	—
KT61 (BT)	—	—	275	275	−6.7	36.0	6.0	16.0	∞	80	10,000	11.5	6.5	AB_1	—	—
			400	400	−35.0	62.5	*	80.0	∞	560	7,000	32.0	2.0	$UL.AB_1$	—	—
KT66 (BT)	—	—	500	500	−60.0	80.0	*	130.0	∞	—	8,000	50.0	2.0	$UL.AB_1$	—	—
KT66 (T)	—	—	400	—	−38.0	62.5	—	80.0	∞	600	4,000	14.5	3.5	AB_1	—	—
N78 (P)	—	—	250	250	−5.0	35.0	5.5	11.2	—	120	9,000	9.0	4.6	AB_1	—	—
N78 (T)	—	—	350	—	−9.5	28.5	—	21.0	—	330	8,000	6.3	1.6	AB_1	—	—
N727/6AQ5(BT)	—	—	250	250	−15.0	35.0	2.5	30.0	—	—	10,000	10.0	3.0	AB_1	—	—
DA41 (T)	7.5	3.1ψ	1,000	—	0	140.0	—	220.0	—	—	7,000	175.0	5.0	B	UX4	20
HN309 (TP)	—	—	165	165	—	28.0	6.0	28.0	—	220	6,000	5.2	2.3	AB_1	—	—
PCL83/LN309 (TP)	—	—	165	165	−11.5	23.0	3.0	28.0	—	440	6,000	5.2	2.3	AB_1	—	—
KT33C (BT)	—	—	200	200	−19.1	56.5	9.0	44.0	∞	240	4,000	15.5	7.5	AB_1	—	—
PL82/N329 (P)	—	—	170	170	—	49.0	16.5	26.0	—	200	4,000	9.0	4.0	AB_1	—	—
UL41/N142 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—
KT55 (BT)	52	0.3ψ	190	190	−25.0	112.5	22.5	28.8	—	185	2,000	25.0	2.0	AB_1	10	36
KT55 (T)	—	—	200	—	−22.0	120.0	—	21.0	—	185	1,500	15.0	—	AB_1		

ψ Each valve of pair. * Included with anode current.

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	$R_{L\ a-a}$ (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
MULLARD																
Obsolete Types																
DL75 (P)	—	—	90	90	—	1.5	0.33	—	—	2,200	100,000	0.1	4.5	AB	—	—
PM2B (DT)	2.0*	0.2	120	—	0	20.0	—	40.0	4,000	—	14,000	1.25	—	B_2	B7	10
QP22B (DP)	2.0*	0.3	120	120	−10.7	3.3	0.45	23.0	∞	—	14,700	1.0	—	B_1	B7	11
KLL32 (DP)	2.0*	0.3	135	135	−11.3	16.9	5.7	12.0	∞	—	16,000	1.2	2.8	AB_1	IO	97
DO30 (T)	—	—	500	—	−145.0	55.0	—	285.0	∞	—	3,400	45.0	3.0	AB_1	—	—
6V6 (BT)	—	—	285	285	—	35.0	2.0	45.0	—	520	8,000	14.0	3.5	AB	—	—
6L6 (BT)	—	—	360	270	−22.5	44.0	2.5	72.0	—	—	3,800	47.0	2.0	AB_2	—	—
EL6 (P)	—	—	250	250	—	53.0	8.5	20.0	∞	90	5,000	14.5	2.2	AB_1	—	—
EL22 (P)	—	—	300	300	—	43.0	7.8	26.0	∞	140	8,000	15.4	5.0	A	—	—
EL31 (P)	—	—	800	400	−26.0	30.0	3.1	51.0	—	—	10,000	120	5.0	AB_1	—	—
EL31 (P)	—	—	400	400	—	63.0	8.3	44.0	—	145	7,000	37	5.0	AB_1	—	—
EL35 (P)	—	—	360	270	—	53.0	17.5	65.0	∞	250	7,000	21.0	3.0	AB_1	—	—
EL50 (P)	—	—	375	275	—	62.0	9.0	45.0	∞	165	6,500	28.5	2.25	AB_1	—	—
CL6 (P)	—	—	250	125	—	42.5	12.5	38.0	∞	180	7,000	13.5	6.3	AB_1	—	—
Replacement Types																
DL92 (P)	—	—	90	90	−16.5	8.4	2.7	32.0	—	—	10,000	0.78	6.0	AB_1	—	—
DL96 (P)	—	—	81.5	81.5	−8.5	5.0	1.3	22.5	—	—	16,000	0.44	2.6	B	—	—
Pen428 (P)	—	—	375	275	−23.5	62.0	9.0	45.0	∞	165	6,500	28.0	3.0	AB_1	—	—
6F6 (P)	—	—	315	285	—	31.0	6.0	58.0	—	640	10,000	10.5	3.0	A	—	—
EL32 (P)	—	—	250	250	—	32.0	8.0	42.0	∞	310	8,000	7.0	1.5	A	—	—
EL33 (P)	—	—	250	250	—	28.5	4.6	18.0	∞	140	10,000	8.2	3.1	A	—	—
EL37 (P)	—	—	325	325	—	90.0	30.0	61.0	∞	130	4,000	35.0	4.4	AB_1	—	—
EL37 (P)	—	—	400	400	−36.0	138.0	36.0	70.0	∞	—	3,250	69.0	2.5	AB_1	—	—
EL37 (T)	—	—	400	—	—	80.0	—	77.0	—	245	4,000	20.6	4.3	A	—	—
EL41 (P)	—	—	300	300	—	36.0	9.5	24.0	—	140	9,000	13.0	2.5	AB_1	—	—
EL41 (T)	—	—	300	—	—	33.0	—	9.4	—	150	10,000	4.0	1.0	A	—	—
EL42 (P)	—	—	250	250	—	21.5	6.7	35.0	—	310	15,000	7.0	5.5	AB_1	—	—
EBL21 (P)	—	—	300	300	—	36.0	6.5	20.0	∞	130	9,000	13.2	1.8	AB_1	—	—
UL41 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—
Current Types																
ECL83 (TP)	—	—	200	200	—	29.0	8.5	33.0	—	220§	7,500	7.2	4.2	AB	—	—
EL34 (P)	—	—	375	$Rg_2$600Ω§	−33.0	107.5	23.5	65.0	—	—	3,500	48.0	2.8	—	—	—
EL34 (P)	—	—	400	$Rg_2$800Ω§	−36.0	110.5	23.0	70.0	—	—	3,500	54.0	1.6	—	—	—
EL34 (P)†	—	—	800	400	−39.0	91.0	19.0	66.0	—	—	11,000	100.0	5.0	—	—	—
EL34 (P)	—	—	375	$Rg_2$470Ω§	—	94.0	19.5	56.0	—	260	3,500	35.0	1.7	—	—	—
EL34 (P)	—	—	450	$Rg_2$1kΩ§	—	71.5	22.0	75.0	—	465	6,500	40.0	5.1	—	—	—
EL34 (P)	—	—	430	$Rg_2$1kΩ§	—	70.0	14.0	70.0	—	470	6,000	34.0	2.5	$UL.AB_1$	—	—
EL34 (T)	—	—	430	—	—	70.0	—	70.0	—	440	5,000	19.0	1.8	—	—	—

(Continued)

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	$R_{L\ a-a}$ (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
MULLARD (*Continued*)																
Current Types (*Continued*)																
EL84 (P)	—	—	300	300	—	46.0	11.0	28.0	—	130	8,000	17.0	4.0	AB	—	—
EL85 (P)	—	—	250	250	—	22.1	7.1	34.5	—	310	12,000	6.8	5.4	AB	—	—
EL90 (P)	—	—	250	250	−15.0	35.0	2.5	30.0	—	—	10,000	10.0	3.0	AB_1	—	—
EL91 (P)	—	—	250	250	—	12.8	4.1	34.0	∞	600	24,000	4.0	3.2	AB	—	—
EL95 (P)	—	—	250	250	—	26.0	7.5	13.0	—	360	10,000	7.0	5.0	AB	—	—
EL95 (P)	—	—	250	250	−9.0	24.0	7.5	13.0	—	—	10,000	6.5	3.5	B	—	—
UL84 (P)	—	—	200	200	—	50.0	5.0	41.0	—	150§	3,500	15.0	3.5	AB	—	—
PCL82 (TP)	—	—	200	200	—	39.5	16.5	3.5	—	190	6,000	9.8	4.0	AB	—	—
PCL83 (TP)	—	—	200	200	—	29.0	8.5	33.0	—	220	7,500	7.2	4.2	AB	—	—
PL33 (P)	—	—	250	250	—	28.5	4.8	18.0	∞	140	10,000	8.2	3.1	A	—	—
PL82 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—

† Fixed bias and separate screen grid supply. § Common resistor.

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	$R_{L\ a-a}$ (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
S.T.C.																
Current Types																
5B/254M (T)	6.3	0.9ψ	400	—	−45.0	140.0	—	90.0	—	—	3,000	15.0	3.0	AB_1	B8B	66
5B/255M (T)																65
828 (P)	10.0	3.25ψ	1,700	750	−120.0	248.0	43.0	240.0	—	—	16,200	300.0	1.0	AB_1	UX5	8
			1,250	750	−120.0	150.0	—	—	—	—	12,500	200.0	<1			

ψ Each valve.

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	$R_{L\ a-a}$ (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
TUNGSRAM																
Obsolete Types																
CB215 (DT)	2.0*	0.22	135	—	0	12.0	—	—	—	—	10,000	1.7	—	B_2	B7	10
CB215S															Ct8	28
CB220 (DT)	2.0*	0.35	150	—	−3.0	15.0	—	—	4,000	—	10,000	2.0	—	B_2	B7	10
ELL1 (DT)	6.3	0.45	250	250	−21.5	15.0	2.5	43.0	∞	600	16,000	5.4	—	A	Ct8	19
Replacement Type																
EL42 (P)	—	—	250	250	−21.5	6.7	—	35.0	—	310	15,000	7.0	5.5	AB_1	—	—
Current Types																
3C4 (P)	—	—	81.5	81.5	−8.5	1.0	0.2	20.0	—	—	16,000	0.44	2.2	B	—	—
3S4 (P)	—	—	90	90	−16.5	8.4	2.7	32.0	—	—	10,000	0.78	6.0	AB_1	—	—
807 (BT)	—	—	400	300	−25.0	45–120	1–9	78.0	—	—	3,200	55.0	—	AB_2	—	—
807 (BT)	—	—	500	300	−29.0	36–120	1–8	86.0	—	—	4,240	75.0	—	AB_2	—	—
807 (BT)	—	—	600	300	−30.0	30–100	1–6	78.0	—	—	6,400	80.0	—	AB_2	—	—
807 (T)	—	—	750	300	−32.0	26–120	1–8	92.0	—	—	6,950	15.0	3.0	AB_1	—	—
	—	—	400	—	−45.0	30–70	—	90.0	—	—	3,000	15.0	3.0	AB_1	—	—
16A5 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—
45A5 (P)	—	—	170	170	—	49.0	16.5	26.0	—	100	4,000	9.0	4.0	AB_1	—	—
6AM5 (P)	—	—	250	250	—	12.8	4.1	34.0	∞	600	24,000	4.0	3.2	A	—	—
6BQ5 (P)	—	—	300	300	—	46.0	11.0	28.0	—	130	8,000	17.0	4.0	AB	—	—
6CK5 (P)	—	—	300	300	—	36.0	9.5	24.0	—	140	9,000	13.0	2.5	AB_1	—	—
6CK5 (T)	—	—	300	—	—	33.0	—	9.4	—	150	10,000	4.0	1.0	A	—	—
6F6 (P)	—	—	315	285	−24.0	31.0	6.0	48.0	∞	—	10,000	11.0	4.0	A	—	—
6F6 (P)	—	—	315	285	—	31.0	6.0	58.0	∞	640	10,000	10.5	3.0	A	—	—
6L6 (BT)	—	—	270	270	—	67.0	5.5	40.0	∞	250	5,000	18.5	2.0	A	—	—
6L6 (BT)	—	—	360	270	—	44.0	2.5	57.0	∞	500	9,000	24.0	4.0	AB_1	—	—
6L6 (BT)	—	—	360	270	−22.5	44.0	2.5	72.0	∞	—	3,800	47.0	2.0	AB_2	—	—
6V6 (BT)	—	—	285	285	−19.0	35.0	2.0	38.0	∞	500	8,000	14.0	3.5	AB_1	—	—
6AQ5 (BT)	—	—	250	250	−15.0	35.0	2.5	30.0	∞	—	10,000	10.0	3.0	AB_1	—	—
EL32 (P)	—	—	250	250	—	32.0	8.0	42.0	∞	310	8,000	7.0	1.5	A	—	—
EL33 (P)	—	—	250	250	—	28.5	4.8	18.0	∞	140	10,000	8.2	3.1	A	—	—
EL37 (P)	—	—	325	325	—	90.0	30.0	61.0	∞	130	4,000	35.0	4.4	AB_1	—	—
EL37 (P)	—	—	400	400	−36.0	138.0	36.0	70.0	∞	—	3,250	69.0	2.5	AB_1	—	—
EL37 (T)	—	—	400	—	—	80.0	—	77.0	—	245	4,000	20.6	4.3	A	—	—
EL85 (P)	—	—	250	250	−22.1	7.1	34.5	—	—	310	12,000	6.8	5.4	AB	—	—
EL95 (P)	—	—	250	250	—	26.0	7.5	13.0	—	360	10,000	7.0	5.0	AB	—	—
EL95 (P)	—	—	250	250	−9.0	24.0	7.5	13.0	—	—	10,000	6.5	3.5	B	—	—
PL33 (P)	—	—	250	250	—	28.5	4.8	18.0	∞	140	10,000	8.2	3.1	A	—	—
PP60 (BT)	—	—	390	275	—	62.5	9.0	70.0	∞	500	8,000	30.0	6.0	AB_1	—	—
PP60 (BT)	—	—	480	385	−40.0	87.5	9.5	80.0	∞	—	6,000	50.0	5.0	AB_1	—	—
PP60 (T)	—	—	400	—	−38.0	62.5	—	80.0	∞	600	4,000	14.5	3.5	AB_1	—	—

Type	Heater		Volts			Current (mA) (per valve)		Input Volts (peak) g—g	R_{IN} (Ω)	R_K (per valve) (Ω)	R_L a—a (Ω)	Power Output (W)	D (%)	Class	Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen								Type	Ref.
AMERICAN																
1E7	2.0*	0.24	135	135	−7.5	10.5	3.5	15.0	∞	—	24,000	0.57	0.55	A	IO	97
1G6	1.4*	0.1	90	—	0	11.0	—	48.0	2,500	—	12,000	0.35	4.0	B_2	IO	96
1J6	2.0*	0.25	135	—	0	—	—	—	—	—	10,000	2.1	—	B_2	IO	96
4A6	2.0*	0.12ψ	90	—	−1.5	10.8	—	—	—	—	8,000	1.0	—	B_2	IO	95
2A3	—	—	300	—	−62.0	40.0	—	—	∞	—	3,000	15.0	2.5	AB_1	—	—
6A3	—	—	300	—	—	40.0	—	—	∞	1,550	5,000	10.0	5.0	AB_1	—	—
2E30	—	—	250	250	−25.0	40.0	6.8	—	∞	—	8,000	12.5	—	AB_1	—	—
			250	250	−30.0	60.0	10.0	—	—	—	3,000	17.0	—	AB_2	—	—
6A6 } (DT)	6.3	0.8	300	—	0	35.0	—	82.0	—	—	8,000	10.0	8.0	B_2	UX7	5
6N7 }															IO	22
6A5 (T)	—	—	325	—	−68.0	40.0	—	—	∞	1,700	5,000	10.0	—	AB_1	—	—
6AC5 (T)	—	—	250	—	0	—	—	—	—	—	10,000	8.0	—	B_2	—	—
6E6 (DT)	6.3	0.6	250	—	−27.5	18.0	—	—	—	—	14,000	1.6	—	A	UX7	5
6Y7 (DT)	6.3	0.3	250	—	0	10.6	—	—	—	—	14,000	—	—	B_2	IO	22
6Z7 (DT)	6.3	0.3	180	—	0	8.4	—	—	—	—	12,000	4.2	—	B_2	IO	22

ψ Filament current per valve of pair.

OUTPUT VALVES 3

(For television line scan)

Type	Heater		Anode Supply Volts	Screen Volts	Typical R_K (Ω)	Positive Surge Anode Volts (max.)	Negative Surge Grid Volts (max.)	Max. Diss. (W)		Typical Current (mA)		Base	
	Volts	Amps						Anode	Screen	Anode	Screen	Type	Ref.
BRIMAR													
Obsolete Type													
19BG6 (BT)	19.0	0.3	Other data as Type 6BG6										
Replacement Types													
6BG6 (BT)	6.3	0.9	700	350	100	6,000	−400	20	3.2	70.0	6.0	IO	39
6CD6 (BT)	6.3	2.5	700	175	—	6,600	−200	15	3.0	100.0	6.0	IO	39
50CD6 (BT)	50.0	0.3	Other data as Type 6CD6										
Current Types													
PL81/21A6	21.5	0.3	170	170	—	7,000	—	8	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,500	10	5.0	100.0	8.0	IO	129
COSSOR													
Obsolete Type													
61BT	6.3	0.7	200	200	470	5,000	—	8	1.75	40.0	3.5	IO	38
Replacement Types													
41MPT	4.0	1.0	—	200	—	4,000	—	—	—	22.0	—	B7	5
42MPT	4.0	2.0	—	250	—	4,000	—	—	—	36.0	—	B7	5
62BT	6.3	1.27	180	180	160	8,000	—	25	5.5	120.0	9.5	IO	38
185BTA (BT)	18.0	0.45	180	180	140	10,000	—	25	5.5	120.0	10.0	IO	38
Current Types													
EL38	6.3	1.4	300	250	120	8,000	—	25	8.0	64.0	18.0	IO	40
EL81	6.3	1.05	250	250	—	7,000	—	8	4.5	32.0	2.4	B9A	17
185BT	18.0	0.45	180	180	160	8,000	—	25	5.5	120.0	9.5	IO	38
PL81/21A6	21.5	0.3	170	170	—	7,000	—	8	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,500	8	5.0	100.0	8.0	IO	129
PL38	30.0	0.3	200	200	—	8,000	—	25	8.0	75.0	9.0	IO	40
EDISWAN MAZDA													
Obsolete Types													
AC/6Pen (BT)	4.0	1.75	310	210	90	3,000	—	20	3.0	63.0	14.0	B7	36
Pen46 (BT)	4.0	1.75	315	230	100	3,000	—	20	3.4	63.0	14.0	MO	14

(Continued)

Type	Heater		Anode Supply Volts	Screen Volts	Typical R_K (Ω)	Positive Surge Anode Volts (max.)	Negative Surge Grid Volts (max.)	Max. Diss. (W)		Typical Current (mA)		Base	
	Volts	Amps						Anode	Screen	Anode	Screen	Type	Ref.
EDISWAN MAZDA *(Continued)*													
Replacement Types													
6P28 (BT)	6.3	1.1	350	250	100	5,000	—	15.0	4.5	27.0	16.0	IO	38
20P1* (BT)	38.0	0.2	400	250	—	6,000	1,500	15.0	5.0	—	—	IO	38
20P4	38.0	0.2	400	250	—	6,000	—	10.0	4.0	—	—	IO	38
Current Types													
30P4 (BT)	25.0	0.3	400	250	—	6,500	—	10.0	4.0	—	—	IO	129
30P19 (BT)	25.0	0.3	400	250	—	7,000	—	10.0	5.0	—	—	IO	129

* For use under self-oscillating conditions.

EMITRON													
Replacement Types													
185BT (BT)	18.0	0.45	180	180	140	8,000	—	25.0	5.5	120.0	10.0	IO	38
185BTA (BT)	18.0	0.45	180	180	140	10,000	—	25.0	5.5	120.0	10.0	IO	38
FERRANTI													
Replacement Type													
EL81	6.3	1.05	250	250	—	7,000	—	8.0	4.5	32.0	2.4	B9A	17
Current Types													
PL81	21.5	0.3	170	170	—	6,000	1,000	7.0	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,500	12.0	5.0	100.0	7.0	IO	129
G.E.C.													
Obsolete Type													
KT45	4.0	2.0	250	250	—	8,000	—	21.5	3.5	—	—	B7	37
Replacement Types													
N339	20.0	0.3	190	150	—	7,500	—	12.0	4.5	50.0	—	B9A	17
PL81/N359 (P)	21.5	0.3	170	170	—	7,000	—	8.0	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,000	10.0	5.0	100.0	8.0	IO	129
KT36	26.0	0.3	250	200	—	4,000	—	10.0	3.0	—	—	IO	38
Current Type													
N308 (BT)	25.0	0.3	400	250	—	6,000	—	10.0	4.0	—	—	IO	129
MARCONI													
Obsolete Type													
KT44/45	4.0	2.0	—	300	—	8,000	—	21.5	—	—	—	B7	37
Current Types													
N339	20.0	0.3	190	150	—	7,500	—	12.0	4.5	50.0	—	B9A	17
PL81/N152	21.5	0.3	170	170	—	7,000	—	8.0	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,500	8.0	5.0	100.0	8.0	IO	129
KT36	26.0	0.3	250	200	—	4,000	—	10.0	3.0	—	—	IO	38
MULLARD													
Obsolete Type													
EL820	6.3	1.05	250	250	—	7,000	—	8.0	4.5	32.0	2.4	B9A	17
Replacement Types													
EL38	6.3	1.4	300	300	120	8,000	—	25.0	8.0	64.0	18.0	IO	40
PL820	21.5	0.3	170	170	—	7,000	—	8.0	4.5	45.0	3.0	B9A	17
PL38	30.0	0.3	200	200	—	8,000	—	25.0	8.0	75.0	9.0	IO	40
UL44	45.0	0.1	175	175	—	3,500	—	5.0	3.0	30.0	4.7	B8A	16
Current Types													
EL36	6.3	1.25	100	100	—	7,000	1,500	12.0	5.0	100.0	7.0	IO	129
EL81	6.3	1.05	250	250	—	7,000	—	8.0	4.5	32.0	2.4	B9A	17
PL81	21.5	0.3	170	170	—	6,000	—	8.0	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,000	10.0	5.0	100.0	8.0	IO	129
TUNSGRAM													
Current Types													
6CJ6	6.3	1.05	250	250	—	7,000	—	8.0	4.5	32.0	2.4	B9A	17
EL38	6.3	1.4	300	250	120	8,000	—	25.0	8.0	64.0	18.0	IO	40
21A6	21.5	0.3	170	170	—	7,000	—	8.0	4.5	45.0	3.0	B9A	17
PL36	25.0	0.3	170	170	—	7,000	1,500	8.0	5.0	100.0	8.0	IO	129
PL38	30.0	0.3	200	200	—	8,000	—	25.0	8.0	75.0	9.0	IO	40
UL44	45.0	0.1	175	175	—	3,500	—	5.0	3.0	30.0	4.7	B8A	17

THERMIONIC DIODES

Type	Heater		Max. Input Volts (r.m.s.)	Max. Rect. Current (mA)	No. of Diodes	Capacitances (pF)			Base	
	Volts	Amps				a′-k	a′′-k	a′-a′′	Type	Ref.
BRIMAR										
Obsolete Types										
6H6	6.3	0.3	150	8.0	2	3.0	4.0	0.1	IO	53
10D1	13.0	0.2	50	8.0	2	5.0	5.0	0.6	B5	3
Current Types										
6AL5, 5726 (SQ), 6058 (SQ)	6.3	0.3	150	9.0	2	3.2	3.2	0.026	B7G	18
COSSOR										
Obsolete Types										
220DD	2.0	0.2	20	1.0	2	3.5	3.5	0.7	B5	3
DD4	4.0	0.75	100	10.0	2	3.7	3.7	0.7	B5	3
DDL4	4.0	0.75	100	10.0	2	4.0	4.0	2.5	B5	3
6H6	6.3	0.3	117	8.0	2	3.0	4.0	0.1	IO	53
SD6	6.3	0.15	150	10.0	1	1.45	—	—	B7G	39
12H6	12.6	0.15	Other data as Type 6H6							
Current Types										
EB91	6.3	0.3	150	9.0	2	3.2	3.2	0.026	B7G	18
SD61	6.3	0.15	50	5.0	1	2.1	—	—	B3G	1
EDISWAN MAZDA										
Obsolete Types										
1D13	1.4	0.15	130	0.5	1	0.6	—	—	B7G	13
DD207	2.0*	0.075	—	—	2	4.0	3.25	0.8	B4	5
AC/DD	4.0	1.0	—	—	2	5.0	5.0	1.2	B5	3
D1	4.0	0.2	125	5.0	1	2.1	—	—	B3G	1
DD41	4.0	0.5	175	5.0	2	4.0	4.25	0.06	MO	13
V914	4.0	0.3	—	0.5	2	3.5	3.0	0.25	B5	3
DD620	6.0	0.2	—	0.5	2	3.5	3.0	0.25	B5	3
6D1	6.3	0.15	125	5.0	1	2.1	—	—	B3G	1
DD101	10.0	0.2	175	5.0	2	5.0	4.6	0.06	MO	13
Replacement Types										
6D3*	6.3	0.3	—	5.0	1	—	—	—	B7G	50
20D1	9.5	0.2	175	9.0	2	3.4	3.4	0.018	B7G	18
Current Types										
6D2	6.3	0.3	175	9.0	2	3.4	3.4	0.018	B7G	18
10D2	19.0	0.1	175	9.0	2	3.4	3.4	0.018	B7G	18
	* Slow-heating cathode.									
EMITRON										
Current Type										
6AL5	6.3	0.3	150	9.0	2	3.0	3.0	0.026	B7G	18
FERRANTI										
Obsolete Types										
SD, ZD	7.0	0.2	50	1.0	1	—	—	—	B5	8
Replacement Types										
6H6	6.3	0.3	150	8.0	2	3.0	4.0	0.1	IO	53
EB41	6.3	0.3	150	9.0	2	<0.01	<0.01	<0.03	B8A	10
Current Types										
6AL5/EB91	6.3	0.3	150	9.0	2	3.2	3.2	0.025	B7G	18
DD6	6.3	0.3	150	9.0	2	3.0	3.1	0.026	B7G	18
G.E.C.										
Obsolete Type										
D42	4.0	0.4	75	15.0	1	4.0	—	—	B4	8
Replacement Types										
D41	4.0	0.3	—	—	2	3.5	2.5	0.5	B5	3
D63	6.3	0.3	100	2.0	2	6.0	7.0	0.18	IO	53

(Continued)

Type	Heater		Max. Input Volts (r.m.s.)	Max. Rect. Current (mA)	No. of Diodes	Capacitances (pF)			Base	
	Volts	Amps				a′-k	a′′-k	a′-a′′	Type	Ref.
G.E.C. (*Continued*)										
Current Types										
A2087*	4.4	0.64	200	20	—	—	—	—	B7G	80
CV2341*	5.0	4.0	400	200	—	—	—	—	Coaxial	
CV2398*	6.0	1.15	200	85	—	—	—	—	B9A	69
EB91/D77	6.3	0.3	120	5.0	2	2.2	2.2	0.025	B7G	18
	* Noise generators.									
HIVAC										
Obsolete Types										
7A3	1.4	0.15	117	0.5	1	0.4	—	—	B7G	13
ACDD	4.0	1.0	—	—	2	3.0	2.4	0.4	B5	3
MARCONI										
Obsolete Types										
D41	4.0	0.3	—	—	2	3.5	2.5	0.5	B5	3
D152	6.3	0.3	150	9.0	2	3.0	3.0	0.03	B7G	18
Replacement Types										
D42	4.0	0.6	75	15.0	1	4.0	—	—	B4	8
D43	4.0	0.6	75	15.0	1	4.0	—	—	B4	1
D63	6.3	0.3	100	2.0	2	6.0	7.0	0.18	IO	53
Current Type										
EB91/D77	6.3	0.3	120	5.0	2	3.5	3.5	0.025	B7G	18
MULLARD										
Obsolete Types										
2D2	2.0	0.09	90	0.5	2	2.8	2.8	<0.5	B5	3
2D4A	4.0	0.65	200	0.8	2	4.5	4.5	<0.5	B5	3
2D4B	4.0	0.35	200	0.8	2	3.8	3.9	<0.07	B7	21
T4D	4.0	0.2	50	5.0	1	2.1	—	—	B3G	1
EAB1	6.3	0.2	200	0.8	3	1.5	1.35	<0.65	Ct8	17
EB4	6.3	0.2	200	0.8	2	1.2	1.2	<0.2	Ct8	10
2D13C	13.0	0.2	200	0.8	2	4.5	4.5	0.3	B5	3
Replacement Types										
EA50	6.3	0.15	50	5.0	1	2.1	—	—	B3G	1
EB34	6.3	0.2	200	0.8	2	4.5	4.5	0.5	IO	53
EB41	6.3	0.3	150	9.0	2	<0.01	<0.01	<0.03	B8A	10
UB41	19.0	0.1	150	9.0	2	<0.01	<0.01	<0.03	B8A	10
Current Types										
DA90	1.4	0.15	117	0.5	1	0.4	—	—	B7G	13
6AL5, M8212	6.3	0.3	117	9.0	2	3.1	3.1	50.026	B7G	18
EA76	6.3	0.15	150	9.0	1	2.5	—	—	B5B	1
EB91, M8079 (SQ)	6.3	0.3	150	9.0	2	3.0	3.0	<0.025	B7G	18
TUNGSRAM										
Obsolete Types										
D418	4.0	0.18	100	5.0	1	7.0	—	—	B4	10
DD4	4.0	0.65	200	0.8	2	4.0	4.0	0.5	B5	3
DD4D	4.0	0.4	100	4.0	2	4.5	4.5	4	B7	21
DD465	4.0	0.65	200	0.8	2	—	—	—	B5	4
6H6	6.3	0.3	150	8.0	2	3.0	4.0	0.1	IO	53
DD6	6.3	0.2	200	0.8	2	3.5	3.5	0.5	B5	3
DD6G	6.3	0.3	165	10.0	2	3.0	3.0	0.016	B7G	18
EAB1	6.3	0.2	200	0.8	3	2.25	1.0	0.4	Ct8	17
EB4	6.3	0.2	100	0.8	2	1.2	1.2	0.2	Ct8	10
DD818	8.0	0.18	100	1.5	2	—	—	—	B5	4
DD13	13.0	0.2	200	0.8	2	4.0	4.0	0.5	B5	3
Current Type										
6AL5	6.3	0.3	150	9.0	2	3.2	3.2	0.026	B7G	18
AMERICAN										
Current Types										
1R4	1.4*	0.15	30	0.34	1	2.4	—	—	B8B	23
6AN6	6.3	0.2	75	3.5	4	—	—	—	B7G	38
6H4	6.3	0.15	100	4.0	1	—	—	—	IO	56
6H6	6.3	0.3	150	8.0	2	3.0	4.0	0.1	IO	53
7A6	6.3	0.15	150	10.0	2	2.0	2.6	0.1	B8B	11
7C4	6.3	0.15	150	8.0	1	0.85	—	—	B8B	23
12H6	12.6	0.3	150	8.0	2	3.0	4.0	0.1	IO	53
12AL5	12.6	0.15	150	9.0	2	3.2	3.2	0.026	B7G	18

SEMICONDUCTOR DIODES

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current at +1V (mA)	Application	Connections
A.E.I.								
Obsolete Types								
CG1-E	Germanium	65	30	—	<1,000	>4	General-purpose diode	Wire ended
CG4-E	Germanium	80	30	—	<100	>3.3	High-voltage general-purpose diode	Wire ended
							TV g.p. diode	Wire ended
CG6-E	Germanium	70	30	<50	—	>2	High-voltage general-purpose diode	Wire ended
CG10-E	Germanium	100	30	<50	<250	>2	TV detector diode	Wire ended
CG12-E	Germanium	25	30	<200	—	>3.3		Wire ended
Current Types								
CG60H	Germanium	150	30	<10	<35	>3	General purpose	Wire ended
CG61H	Germanium	100	30	<10	<50	>3	General purpose	Wire ended
CG62H	Germanium	100	30	<20	<100	>3	General purpose	Wire ended
CG63H	Germanium	100	30	<40	<200	>3	General purpose	Wire ended
CG64H	Germanium	45	30	<200	—	>3	TV detector	Wire ended
Frequency converters; CS2A, CS3A (single plug); CS3B, CS9B (coaxial), and detector CS4B (coaxial)								
BRIMAR								
Current Types								
GD3	Germanium	25	30	−200	—	3	Vision and sound detector	Axial lead wires
GD4	Germanium	50	30	−40	—	3	Detector and noise limiter	Axial lead wires
GD5	Germanium	85	30	−20	—	3	Detector and noise limiter	Axial lead wires
M1	Selenium	68	0.25	—	—	0.5*	R.f. rectifier	Wires
M3	Selenium	68	1	—	—	4*	L.f. rectifier	Wires
* At +5 volts.								
EDISWAN MAZDA								
Current Types								
XD201	Germanium	—	—	—	—	>0.1‡	A.v.c.clamping diode in transistor receivers	Wire ended
XD202	Germanium	—	—	—	—	>4.3	Signal detector in transistor receivers	Wire ended
‡ At 0.3V.								
FERRANTI								
Current Types								
ZS7	Silicon junction	30	100	—	<0.1†	—	General purpose diodes	Wires—single ended
ZS8	Silicon junction	30	100	—	<0.005†	—	General purpose diodes	Wires—single ended
ZS10A	Silicon junction	60	100	<0.05	0.05	100*	Magnetic amplifiers, demodulators, etc.	Wires—single ended
ZS10B	Silicon junction	60	100	<0.5	0.5	100*	Magnetic amplifiers, demodulators, etc.	Wires—single ended
ZS20A	Silicon junction	120	100	<0.05	0.05	100*	Magnetic amplifiers, demodulators, etc.	Wires—single ended
ZS20B	Silicon junction	120	100	<0.5	0.5	100*	Magnetic amplifiers, demodulators, etc.	Wires—single ended
ZS21	Silicon junction	200	100	—	0.5†	100	Magnetic amplifiers, demodulators, etc.	Wires—single ended
ZS22	Silicon junction	300	100	—	<0.5†	100	Magnetic amplifiers, demodulators, etc.	Wires—single ended
ZS40	Silicon junction	25	25	—	<0.5†	—	High-speed switching	Wires—single ended
ZS41	Silicon junction	50	25	—	<0.5†	—	High-speed switching	Wires—single ended
ZS42	Silicon junction	100	25	—	<0.5†	—	High-speed switching	Wires—single ended
ZW2	Silicon junction	10	100	—	<0.5†	—	Surge limiter	Wires—single ended
† At P.I.V.								
G.E.C.								
Obsolete Types								
GEX55/1	Germanium	> 75	30	—	<200	> 1	General purpose	Cathode end red
GEX54/4	Germanium	>170	30	—	<500 at −150V	> 2	General purpose	Cathode end red
Current Types								
GEX34	Germanium point-contact	50	30	7	80	3.5	TV detector	Cathode end red
GEX35	Germanium point-contact	25	30	35	—	4	Ring modulator	Cathode end red
GEX36	Germanium point-contact	25	30	<100	—	5‡	High-efficiency r.f. diodes	Cathode end red
GEX37	Germanium point-contact	25	30	<60	—	10	High-efficiency r.f. diodes	Cathode end red
GEX39	Germanium point-contact	25	30	60	—	20	High-efficiency r.f. diodes	Cathode end red
GEX45/1	Germanium point-contact	50	30	8	200	6	General purpose	Cathode end red
GEX54	Germanium point-contact	80	30	3	45	6	High-voltage diodes	Cathode end red
GEX58	Germanium point-contact	100	30	3	40	6	High-voltage diodes	Cathode end red
GEX64	Germanium point-contact	—	30	—	—	5††	Ring modulator	Cathode end red
GEX66	Germanium point-contact	—	30	—	—	5‡‡	Mixer	Cathode end red

(Continued)

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current at +1V (mA)	Application	Connections
G.E.C. (*continued*)								
Current Types (Continued)								
SVC1	Silicon	20	200	10μA at −20V		100**	Variable capacitance diodes for a.f.c., etc.	Cathode lead red
SVC2	Silicon	20	200	10μA at −20V		100**	Variable capacitance diodes for a.f.c., etc.	Cathode lead red
SVC3	Silicon	20	200	10μA at −20V		100**	Variable capacitance diodes for a.f.c., etc.	Cathode lead red
SX780	Silicon	25	50	50‡‡‡	—	10**	High-speed switching	Cathode lead red
SX781	Silicon	60	50	50***	—	10**	High-speed switching	Cathode lead red
SX782	Silicon	120	50	50†††	—	10**	High-speed switching	Cathode lead red
‡‡‡ At 25V 100°C. *** At 60V 100°C. ††† At 120V 100°C. ** At less than +1.5V. ‡ At 0.7V. †† At 0.25V. ‡‡ At 0.5V.								
MULLARD								
Obsolete Types								
OA60	Germanium	30	5.0	—	—	—	Video signal detector	Wires. Coloured band at positive end
OA61	Germanium	100	5.0	—	—	—	Video signal detector	Wires. Coloured band at positive end
OA71	Germanium		Replaced by OA81				D.c.r., sync. clipper	Wires. Coloured band at positive end
Current Types								
OA7	Germanium	25	140	1.5	6.0 (at −25V)	250	High speed switching	Wires. Cathode adjacent to red dot
OA10	Germanium	30	50	<5 (at −3V)	<10 (at −20V)	—	Pulse circuits. Has low hole storage	Wires. Cathode adjacent to red dot
OA47	Germanium	25	50	4.5	30 (at −25V)	—	High speed switching	Wires. Cathode adjacent to red dot
OA70	Germanium	22.5	50	—	—	—	Video signal detector	Wires. Cathode adjacent to red dot
OA73	Germanium	30	50*	100	1,200 (at −30V)	8	—	Wires. Cathode adjacent to red dot
OA79 (2-OA79)	Germanium	45	4	4.5	90 (at −45V)	4	A.m./f.m. detectors	Wires. Cathode adjacent to red dot
OA81	Germanium	115	50*	4	18	6	General purpose	Wires. Cathode adjacent to red dot
OA85	Germanium	115	50*	7	20	8	General purpose	Wires. Cathode adjacent to red dot
OA86	Germanium	90	35*	2.5	22	> 5	Computing	Wires. Cathode adjacent to red dot
OA90	Germanium	30	10	20	300 (at −30V)	10	G.P. industrial	Wires. Cathode adjacent to red dot
OA91	Germanium	115	50*	4	17	7	G.P. industrial	Wires. Cathode adjacent to red dot
OA95	Germanium	115	50*	2.5	12	9	G.P. industrial	Wires. Cathode adjacent to red dot

* Averaged over any 50ms period or d.c. component, at an ambient temperature of 25°C with zero inverse voltage. At higher ambient temperatures, and when appreciable inverse voltages occur during part of the cycle, a derating must be applied.

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current at +1V (mA)	Application	Connections
S.T.C.								
Replacement Types								
2X102/G	Germanium	85	15	6	33	2.5	Audio and low r.f. rectifier	Axial lead wires
2X103/G	Germanium	30	40	5	—	5	Audio and low r.f. rectifier	Axial lead wires
2X104/G	Germanium	30	40	20	—	3	Audio and low r.f. rectifier	Axial lead wires
2X105/G	Germanium	100	25	5	45	4	Audio and low r.f. rectifier	Axial lead wires
2X106/G	Germanium	70	50	50	450	7	Audio and low r.f. rectifier	Axial lead wires
Current Types								
GD8	Germanium	85	30	7	—	5	Industrial	Wires
GD9	Germanium	125	50	—	50	9	Interference limiter	Wires
GD10	Germanium	150	40	—	40	7.5	Interference limiter	Wires
GD11	Germanium	50	100	—	—	10–20	Computing	Wires
GD12	Germanium	25	40	—	—	—	Detector	Wires
TEXAS								
Current Types								
1S121	Diffused silicon	150	50	<0.1 (at −150V)		—	General purpose	Axial wires. Colour code at cathode
1S914	Diffused silicon "mesa" computer diodes	75	75	<5 (at −75V)		—	V.H.F. operation due to very short recovery times	Axial wires. Colour code at cathode. Glass seal.
1S916	Diffused silicon "mesa" computer diodes	75	75	<5 (at −75V)		—	V.H.F. operation due to very short recovery times	Axial wires. Colour code at cathode. Glass seal.

Type	Nature	Peak Current (mA)	Valley Current (mA)	Working slope resistance (Ω)	Resistive cut-off frequency (Mc/s)	Applications	Connections
1N650	Gallium arsenide tunnel diodes metal case	10	0.5	−20	870	Very high-frequency oscillators, amplifiers and pulse circuits	Reading clockwise from tab; anode, anode, cathode (case)
1N651	Gallium arsenide tunnel diodes metal case	10	0.5	−20	870	Very high-frequency oscillators, amplifiers and pulse circuits	Reading clockwise from tab; anode, anode, cathode (case)
1N652	Gallium arsenide tunnel diodes metal case	5	0.5	−40	620	Very high-frequency oscillators, amplifiers and pulse circuits	Reading clockwise from tab; anode, anode, cathode (case)
1N653	Gallium arsenide tunnel diodes metal case	5	0.5	−40	415	Very high-frequency oscillators, amplifiers and pulse circuits	Reading clockwise from tab; anode, anode, cathode (case)

Type	Nature	Maximum Voltage	Sensitivity (μA/ft-candle)	Dark Current (μA)	Applications	Connections
1S701	Diffused silicon photo-duo-diode	±50	0.6	0.01	Reading punched tapes at up to 20 kc/s	Two wires at one end, reversible, glass seal

Semiconductor Diodes

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current at +1V (mA)	Application	Connections
WESTINGHOUSE								
Current Types								
39K1	Selenium	85	0.1	100 (max.) at −60V.		0.8 (min.) at + 1.7V.		Wires
39K2	Selenium	170	0.1	100 (max.) at −120V.		0.8 (min.) at + 3.4V.	High-voltage low-power detectors	Wires
39MA1	Selenium	85	0.1	100 (max.) at −60V.		0.8 (min.) at + 1.7V.		Wires
39MA2	Selenium	170	0.1	100 (max.) at −120V.		0.8 (min.) at + 3.4V.		Wires
39MA3	Selenium	225	0.1	100 (max.) at −180V.		0.8 (min.) at + 5.1V.	—	Wires
39MA4	Selenium	340	0.1	100 (max.) at −240V.		0.8 (min.) at + 6.8V.	—	Wires
310EA1	Selenium	60	0.01 (mean)	0.05 (max.)	10 (max.)	0.04 (min.)	Very high impedance detector	Wires
KF1	Copper oxide	6	1	100 (max.) at −6V.		1 (min.) at + 0.7V.		Wires
KF2	Copper oxide	12	1	100 (max.) at −12V.		1 (min.) at + 1.4V.	Instrument rectifiers, modulators etc.	Wires
KF4	Copper oxide	24	1	100 (max.) at −24V.		1 (min.) at + 2.8V.		Wires
KF6	Copper oxide	36	1	100 (max.) at −36V.		1 (min.) at + 4.2V.		Wires
KG1	Copper oxide	6	5	175 (max.) at −6V.		5 (min.) at + 0.7V.		Wires
KG2	Copper oxide	12	5	175 (max.) at −12V.		5 (min.) at + 1.4V.	Instrument rectifiers, modulators etc.	Wires
KG4	Copper oxide	24	5	175 (max.) at −24V.		5 (min.) at + 2.8V.		Wires
KG6	Copper oxide	36	5	175 (max.) at −36V.		5 (min.) at + 4.2V.		Wires
KH1	Copper oxide	6	10	300 (max.) at −6V.		10 (min.) at + 0.7V.		Wires
KH2	Copper oxide	12	10	300 (max.) at −12V.		10 (min.) at + 1.4V.	Instrument rectifiers, modulators etc.	Wires
KH4	Copper oxide	24	10	300 (max.) at −24V.		10 (min.) at + 2.8V.		Wires
KH6	Copper oxide	36	10	300 (max.) at −36V.		10 (min.) at + 4.2V.		Wires
W1	Copper oxide	6	0.25	50 (max.) at −6V.		5 (min.) at + 2.4V.		Wires
W2	Copper oxide	12	0.25	50 (max.) at −12V.		5 (min.) at + 4.8V.		Wires
W3	Copper oxide	18	0.25	50 (max.) at −18V.		5 (min.) at + 7.2V.		Wires
W4	Copper oxide	24	0.25	50 (max.) at −24V.		5 (min.) at + 9.6V.		Wires
W5	Copper oxide	30	0.25	50 (max.) at −30V.		5 (min.) at +12.0V.		Wires
W6	Copper oxide	36	0.25	50 (max.) at −36V.		5 (min.) at +14.4V.		Wires
W7	Copper oxide	42	0.25	50 (max.) at −42V.		5 (min.) at +16.8V.	Detectors, a.g.c. noise suppressors, clippers, etc.	Wires
W8	Copper oxide	48	0.25	50 (max.) at −48V.		5 (min.) at +19.2V.		Wires
W9	Copper oxide	54	0.25	50 (max.) at −54V.		5 (min.) at +21.6V.		Wires
W10	Copper oxide	60	0.25	50 (max.) at −60V.		5 (min.) at +24.0V.		Wires
W11	Copper oxide	66	0.25	50 (max.) at −66V.		5 (min.) at +26.4V.		Wires
W12	Copper oxide	72	0.25	50 (max.) at −72V.		5 (min.) at +28.8V.		Wires
W13	Copper oxide	78	0.25	50 (max.) at −78V.		5 (min.) at +31.2V.		Wires
W14	Copper oxide	84	0.25	50 (max.) at −84V.		5 (min.) at +33.6V.		Wires
W15	Copper oxide	90	0.25	50 (max.) at −90V.		5 (min.) at +36.0V.		Wires
WG4A	Germanium	20	50 (mean)	1,000 (max.)	—	2 (min.)	Video detector	Wires
WG4B	Germanium	20	50 (mean)	1,000 (max.)	—	10 (min.)	Crystal receiver det.	Wires
WG5A	Germanium	40	50 (mean)	100 (max.)	—	1 (min.)	Television sound det.	Wires
WG5B	Germanium	60	50 (mean)	100 (max.)	1,000 (max.)	5 (min.)	Television video and sound detector	Wires
WG6A	Germanium	60	50 (mean)	30 (max.)	600 (max.)	1 (min.)	Television noise limiter video and sound	Wires
WG7B	Germanium	40	50 (mean)	10 (max.)	—	5 (min.)	Instrument rectifier	Wires
WG7C	Germanium	100	50 (mean)	10 (max.)	200 (max.)	5 (min.)	General purpose	Wires
WG7D	Germanium	100	50 (mean)	10 (max.)	100 (max.)	3 (min.)	D.c. restorer, sync. separator, f.m. disc	Wires
WX1	Copper oxide	6	0.1	12 (max.) at −6V.		0.5 (min.) at + 2.4V.		Wires
WX2	Copper oxide	12	0.1	12 (max.) at −12V.		0.5 (min.) at + 4.8V.		Wires
WX3	Copper oxide	18	0.1	12 (max.) at −18V.		0.5 (min.) at + 7.2V.		Wires
WX4	Copper oxide	24	0.1	12 (max.) at −24V.		0.5 (min.) at + 9.6V.		Wires
WX5	Copper oxide	30	0.1	12 (max.) at −30V.		0.5 (min.) at +12.0V.		Wires
WX6	Copper oxide	36	0.1	12 (max.) at −36V.		0.5 (min.) at +14.4V.		Wires
WX7	Copper oxide	42	0.1	12 (max.) at −42V.		0.5 (min.) at +16.8V.	Detectors, a.g.c. noise suppressors, clippers, etc.	Wires
WX8	Copper oxide	48	0.1	12 (max.) at −48V.		0.5 (min.) at +19.2V.		Wires
WX9	Copper oxide	54	0.1	12 (max.) at −54V.		0.5 (min.) at +21.6V.		Wires
WX10	Copper oxide	60	0.1	12 (max.) at −60V.		0.5 (min.) at +24.0V.		Wires
WX11	Copper oxide	66	0.1	12 (max.) at −66V.		0.5 (min.) at +26.4V.		Wires
WX12	Copper oxide	72	0.1	12 (max.) at −72V.		0.5 (min.) at +28.8V.		Wires
WX13	Copper oxide	78	0.1	12 (max.) at −78V.		0.5 (min.) at +31.2V.		Wires
WX14	Copper oxide	84	0.1	12 (max.) at −84V.		0.5 (min.) at +33.6V.		Wires
WX15	Copper oxide	90	0.1	12 (max.) at −90V.		0.5 (min.) at +36.0V.		Wires

POINT CONTACT TRANSISTORS

Type	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	I_e max. (mA)	r_b (Ω)	r_e (Ω)	r_c (kΩ)	r_m (Ω)	r_a	Connections
G.E.C.										
Obsolete Types										
GET1	100	−50	−15	—	—	—	—	—	2.5	Base, single lead ; collector coded blue
GET2	75	−30	−15	—	55	—	—	—	3.8	Base, single lead ; collector coded blue
MULLARD										
Obsolete Types										
OC50	120	−30	−12 to +20	−1 to +10	—	—	—	—	2.1	Base, metal casing ; Emit. straight pin
OC51	100	−50	−15	12	—	—	—	—	2.2	Coll., bent pin
S.T.C.										
Replacement Types										
TP1	150	−50	−30	30	135	200	20	60	3	Emitter : red ; collector : black
TP2	150	−50	−30	30	110	140	25	75	3	Emitter : red ; collector : black

SYMMETRICAL TRANSISTORS

Type	p-n-p. or n-p-n.	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters V_c (V)	I_e (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
EDISWAN MAZDA													
Current Type													
XS101	p-n-p	150	12	—	5	1	6.8	460	45	20	5_{max}	$2{,}500_{min}$	Base, centre lead
S.T.C.													
Replacement Types													
TS4	p-n-p	50	>30*	50	0.5	20	—	—	—	>10	−10 max.†	—	Em.-Em. diametrically opposite
TS7	p-n-p	70	12	**	6	1	(Bidirectional R.F. transistor)			35	10_{max}	4,500	Col. white. Base emitter cl'kwise E, C interchangeable. Collector bevelled.
TS8	p-n-p	70	6	**	6	1	(Bidirectional R.F. transistor)			60	10_{max}	8,500	
TK20	p-n-p	200	12	**	4.5	1	—	—	—	40	0.7	6,000	
TK21	p-n-p	200	20	**	9.0	1	—	—	—	22	0.5	2,000	
TK24	p-n-p	200	20	**	12.0	1	—	—	—	40	1.5	3,000	
TK25	p-n-p	200	20	**	9.0	1	—	—	—	60	0.7	11,000	

* This figure is not a max. rating, but refers to min. collector turnover at $I_b = 0$. † At $V_b = +1V$, $V_c = -30V$.
** Limited only by collector dissipation and the fall in current gain at high current.

JUNCTION TRANSISTORS

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
A.E.I.													
Obsolete Types													
GT1	p-n-p	125	9	*	4.5	1	20	700	55	20	5	800	Base centre lead Collector coded white
GT2	p-n-p	125	9	*	4.5	1	20	1,000	50	40	5	900	
GT3	p-n-p	125	9	*	4.5	1	20	1,300	40	60	5	1,000	
GT11	p-n-p	100	9	*	4.5	1	15	430	50	30	5	4,000	
GT12	p-n-p	100	9	*	4.5	1	12	850	40	60	5	6,000	
GT13	p-n-p	100	9	*	4.5	1	10	1,700	33	100	5	9,000	

* The maximum current is limited by collector dissipation and permissible distortion.

Current Types													
GT40	p-n-p	100	15	100	4.5	1	—	—	—	30	2	2,500	Base centre lead Collector coded white
GT41	p-n-p	100	15	100	4.5	1	15	430	50	30	2	4,000	
GT42	p-n-p	100	15	100	4.5	1	12	850	40	60	2	6,000	
GT43	p-n-p	100	15	100	4.5	1	10	1,700	33	100	2	9,000	
GT44	p-n-p	100	25	100	4.5	1	—	—	—	30	2	2,500	
GT45	p-n-p	100	25	100	4.5	1	15	430	50	30	2	4,000	
GT46	p-n-p	100	25	100	4.5	1	12	850	40	60	2	6,000	
GT47	p-n-p	100	25	100	4.5	1	10	1,700	33	100	2	9,000	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
EDISWAN MAZDA													
Current Types													
XA101	p-n-p	120	−20 −16**	—	5	1	8.5	790	40	35	5_{max}	5,000	Base centre lead Collector coded white
XA102	p-n-p	120	−20 −16**	—	5	1	8.1	1,230	38	60	5_{max}	8,000	
XA111	p-n-p	120	−20 −16**	—	5	1	8.5	790	40	35	5_{max}	5,000	Clockwise, emitter, base, collector. Collector coded arrow
XA112	p-n-p	120	−20 −16**	—	5	1	8.1	1,230	38	60	5_{max}	8,000	
XA121	p-n-p	80	−25	10	12	1	I.f amplifier 250–500 kc/s			60	8_{max}	—	Emitter, base, shield and collector in line.
XA122	p-n-p	80	−25	10	12	1	Freq. changer m.w. & l.w.			60	8_{max}	—	
XA123	p-n-p	80	−20	10	12	1	R.f. stage or mixer			60	20_{max}	30,000	
XA124	p-n-p	80	−20	10	12	1	Frequency changer			60	20_{max}	30,000	Shield and collector wider spacing
XA125	p-n-p	80	−18	10	12	1	—	—	—	60	4_{max}	30,000	
XA126	p-n-p	80	−20	10	12	1	—	—	—	60	20_{max}	30,000	
XA131	p-n-p	120	−40	10	12	1.5	—	—	—	60	12_{max}	100,000	Clockwise, emitter, base, collector, shield.
XA141	p-n-p	120	−30	100	7	5	Switching			45§	10_{max}	30,000‡	
XA142	p-n-p	120	−30	100	7	5				45§	10_{max}	50,000‡	
XA143	p-n-p	120	−30	100	7	5				45§	10_{max}	75,000‡	Tag between shield & emitter
XA151	p-n-p	130	−15	—	0.25 2	10 10				20_{min}§	10_{max}	$3{,}000‡_{min}$	Clockwise, emitter, base, collector. Coll. coded arrow
XA152	p-n-p	130	−15	—	0.25 2	10 10				40_{min}§	10_{max}	$5{,}500‡_{min}$	
XA161	p-n-p	150	−13 −12**	100	0.3 3	10 10				50§	3_{max}	$40{,}000‡_{min}$	Clockwise, emitter, base, collector.
XA162	p-n-p	150	−13 −12**	100	0.3 3	10 10				50§	3_{max}	$60{,}000‡_{min}$	
XA701	n-p-n	120	25 15**	200	0.2 6	20 1				40§	8_{max}	$5{,}000_{min}$	Emitter near tag Clockwise, emitter, base, collector. Collector coded arrow
XA702	n-p-n	120	25 15**	200	0.2 6	20 1				50§	8_{max}	$7{,}000_{min}$	
XA703	n-p-n	120	25 15**	200	0.2 6	20 1				70§	8_{max}	$13{,}000_{min}$	
XB102	p-n-p	150	−35 −16** −35***	—	5	1	15	510	74	30	10_{max}	—	Base centre lead. Collector coded white
XB103	p-n-p	150	−35 −16** −35***	—	5	1	21	740	46	66	10_{max}	—	
XB104	p-n-p	120	−20 −16** −20***	—	5	1	—	—	—	30	10_{max}	—	
XB112	p-n-p	150	−35 −16** −35***	—	5	1	15	510	74	30	10_{max}	—	Clockwise, emitter, base, collector. Collector coded arrow
XB113	p-n-p	150	−35 −16** −35***	—	5	1	21	740	46	66	10_{max}	—	
XB121	p-n-p	50	105	100	0.35	5	Switching control transistor			60§	14_{max}	—	As XA161
XC101	p-n-p	165	−35 −16** −35***	—	6	8	2.1	280	10	66	10_{max}	—	As XA101
XC121	p-n-p	250	−35 −16** −35***	—	1	200	—	—	—	74§	10_{max}	—	As XA111
XC131	p-n-p	500††	−35 −16** −35***	—	1	200	—	—	—	74§	10_{max}	—	As XC171
XC141	p-n-p	11,000	−40pk 3,000pk −20d.c. 1,500d.c.		1.5	0.7	—	—	—	62.5	—	—	Collector-flange Emitter and base marked
XC142	p-n-p	11,000	−60pk 3,000pk −30d.c. 1,500d.c.		1.5	0.7	—	—	—	62.5	—	—	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
EDISWAN MAZDA (*Continued*)													
Current Types (Continued)													
XC171	p-n-p	750††	−26 −16** −26***	—	1	400	—	—	—	72§	10_{max}	—	Clockwise, emitter, base, collector (arrow) Matched pair mounted in holder
** Maximum collector to emitter voltage. *** Maximum collector to emitter voltage with $R_b < 500Ω$. § Static current amplification. ‡ f_1 frequency at which modulus of h_{fe} is equal to unity. h_{fe} is small-signal fwd. I transfer ratio with o.p. short-circuited to a.c. †† Mounted on 20 SWG aluminium plate of 12 sq. in. minimum area per transistor.													
FERRANTI													
Current Types													
ZT20	n-p-n	250	20	50	Silicon. General purpose types suitable for high-speed switching, high-frequency oscillators etc.					20–40	0.5	50,000	Clockwise, emitter, base, collector, wide gap between emitter & coll.
ZT21	n-p-n	250	20	50						35–90	0.5	50,000	
ZT22	n-p-n	250	45	50						20–40	0.5	25,000	
ZT23	n-p-n	250	45	50						35–90	0.5	25,000	
G.E.C.													
Obsolete Types													
GET3	p-n-p	100	−15	250	6	1.0	25	400	2,000§§	55	6	1,000	Coll. coded white, then clockwise base, emitter
GET4	p-n-p	50	−30	70	12	1	25	450	2,000§§	50	6	1,000	
GET5	p-n-p	200	−30	350	Medium power						6	1,000	
GET6	p-n-p	50	−12	50	2	0.5	50	700	1,000§§	50	6	1,000	
GET15	p-n-p	600	−15	350	—	—	—	—	—	70	10	950	—
GET16	p-n-p	600	−30	350	—	—	—	—	—	60	10	900	—
GET20	p-n-p	600	−30	500	—	—	—	—	—	60	10	1,000	—
Current Types													
GET102	p-n-p	200‡	−30	1,000	High gain					100	—	1,500	
GET103	p-n-p	200‡	−30	1,000	General purpose					55	—	1,000	
GET104	p-n-p	200‡	−30	1,000	Industrial					55	—	1,000	
GET105	p-n-p	800‡**	−40	1,000	Medium power					30††	—	900	
GET106	p-n-p	200‡	−15	1,000	Low noise					55	—	1,000	Coloured sleeves. Collector white. Emitter red. Base green
GET110	p-n-p	800‡**	−40	1,000	Medium power switching					20††	—	1,000	
GET111	p-n-p	200‡	−60	1,000	High voltage					55	—	1,000	
GET113	p-n-p	200‡	−15	1,000	High gain					100	—	1,500	
GET114	p-n-p	200‡	−15	1,000	General purpose					55	—	1,000	
GET115	p-n-p	800‡**	−15	1,000	Medium power					30††	—	1,000	
GET116	p-n-p	800‡**	−30	1,000						30††	—	1,000	
GET120	p-n-p	800‡**	−30	1,000	Medium power switching					20††	—	1,400	
GET571	p-n-p	18,000‡**	−16	12,000	−1.5	6,000	Power			30††	—	—	Base, collector, emitter, gap. clockwise
GET572	p-n-p	18,000‡**	−32	12,000	−1.5	6,000				30††	—	—	
GET573	p-n-p	18,000‡**	−64	12,000	−1.5	6,000				30††	—	—	
GET691	p-n-p	45‡	−20	10	I.f. amplifier					60	—	30,000	Coloured sleeves. Collector white. Emitter red. Base green
GET692	p-n-p	45‡	−20	10	R.f. and mixer					60	—	40,000	
GET871	p-n-p	75§	−15	150	High-speed switching					45††	—	6,000	
GET872	p-n-p	75§	−15	150						65††	—	15,000	
GET873	p-n-p	75§	−15	10	I.f. amplifier					50	—	6,000	
GET874	p-n-p	75§	−15	10	Mixer transistor					70	—	15,000	
GET875	p-n-p	75§	−15	150	High-speed switching					90††	—	20,000	
‡ At T ambient = 45°C. § At T ambient = 35°C. ** Transistor mounted on cooling fin. †† Large signal common emitter current gain. §§ T network parameters													
HIVAC													
Obsolete Type													
XFT2	p-n-p	50	12	10	3.0	0.5	50	860	3,500§§	49	4	460	Base, centre lead Coll. coded red
§§ T network parameters.													
MULLARD													
Obsolete Type													
OC16	p-n-p	6,250*†	32††	1,500 ($R_b < 200Ω$)	7	300	—	—	—	45**	20 (at $V_c = 14V$)	200	Base, centre lead. Coll. stands apart
Current Types													
AFZ11	p-n-p	50	−20	10	−6.0	1.0	—	15	—	<50	4.0 (at $V_c = -6V$)	14,000§	Collector lead stands apart, shield is base, emitter
ASZ20	p-n-p	100	−40	15	−6.0	1.0	—	>120	—	30	2.0	>40,000	
ATZ10	p-n-p-n	15†	−35	25	−1.0	—	—	—	—	2.1 (d)	<50 ($V_c = -10$)	—	Base centre lead. Collector coded red
BCZ11	p-n-p	210†	−25	50	−6.0	1.0	25	125	—	35	<0.1 ($V_c = -10$)	1,500	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
MULLARD *(Continued)*													
Current Types (Continued)													
OC19	p-n-p	8 000†	−32	1,500	−7	300	—	—	—	45**	20 (V_c=−14)	200	Pins, base and emitter. Mounting plate collector
OC22	p-n-p	6,000†	−32	1,000	−2	100	—	—	—	200**	20 (V_c=−10)	2,000	
OC23	p-n-p	6,000†	−40	1,000	−2	100	—	—	—	200**	20 (V_c=−10)	2,500	
OC24	p-n-p	6,000†	−40	1,000	−2	100	—	—	—	200**	20 (V_c=−10)	2,500	
OC26	p-n-p	12,500†	−32	3,500	−14	30	—	—	—	>20	<20	—	
OC28	p-n-p	30,000†	−30	6,000	−14	30	—	—	—	>20	<20	250	
OC29	p-n-p	30,000†	−60	6,000	−1	1,000	—	—	—	>45	<20 (V_c=−14)	250	
OC35	p-n-p	30,000†	−60	6,000	−1	1,000	—	—	—	>25	<20 (V_c=−14)	250	
OC36	p-n-p	30,000†	−80	6,000	−1	1,000	—	—	—	>30	<20 (V_c=−14)	250	
OC41	p-n-p	43†	−15	50	—	—	—	—	—	40**	10 (V_c=−15)	4,000§	Base centre lead Collector coded red
OC42	p-n-p	43†	−15	50	—	—	—	—	—	80**	10 (V_c=−15)	7,000§	
OC44	p-n-p	20	−10 (R_b≤1kΩ)	5	6	1	—	—	—	100	0.5 (V_c=−2)	15,000	
OC45	p-n-p	20	−10 (R_b≤1kΩ)	5	6	1	—	—	—	50	0.5 (V_c=−2)	6,000	
OC57	p-n-p	10	−7.0	5	−0.5	0.25	—	—	—	35	1.5 (V_c=−2)	10	Collector coded red then clockwise, emitter, base
OC58	p-n-p	10	−7.0	5	−0.5	0.25	—	—	—	55	1.5 (V_c=−2)	10	
OC59	p-n-p	10	−7.0	5	−0.5	0.25	—	—	—	80	1.5 (V_c=−2)	10	
OC60	p-n-p	10	−7.0	5	−0.5	0.25	—	—	—	—	1.5 (V_c=−2)	—	
OC65	p-n-p	25	−5	10	2	0.5	40	1,000	1,400§§	20 to 40	5 (V_c=−4.5)	—	Base, centre lead. Collector coded red
OC66	p-n-p	25	−15 (R_b≤500Ω)	10	2	3	7	500	625§§	30 to 80	8 (V_c=−4.5)	—	
OC70	p-n-p	50	−20 (R_b≤500Ω)	10	2	0.5	40	1,000	1,400§§	20 to 40	8 (V_c=−4.5)	—	
OC71	p-n-p	50	−20 (R_b≤500Ω)	10	2	3	7	500	625§§	30 to 75	8 (V_c=−4.5)	—	
OC72 } 2–OC72 }	p-n-p	100‡‡	−32 (R_b≤1kΩ)	125	5.4	10	—	—	—	70	4.5 (V_c=−10)	350	
OC73	p-n-p	50	−30	10	10	0.5	—	—	—	30 to 65	3.5 (V_c=−4.5)	—	
OC75	p-n-p	75†	−30	10	−2.0	−3	—	—	—	90	4.5 (V_c=−4.5)	900	
OC76	p-n-p	75	−32 (V_{be}=>+1V)	125	5.4	10	—	—	—	>15**	4.5 (V_c=−10)	—	
OC77	p-n-p	75	−60	125	5.4	10	—	—	—	45	4.5 (V_c=−10)	—	
OC83	p-n-p	160†	−32	500	−6	1	25	60	—	90	45 (V_c=−10)	850	
OC84	p-n-p	160†	−32	500	−6	1	25	60	—	90	45 (V_c=−10)	1,000	
OC122	p-n-p	210†	−32	500	−2	100	0.25	80	—	140	40 (V_c=−24)	1,300§	Collector stands apart. No connection, base & emitter
OC123	p-n-p	210†	−50	500	−2	100	0.25	80	—	160	30 (V_c=−10)	1,500§	
OC139	n-p-n	60†	+20	200	+5	0	—	—	—	>20	>3.0 (V_c=0)	3,500	Base centre lead Collector coded red
OC140	n-p-n	60†	+20	200	+5	0	—	—	—	>50	>3.0 (V_c=0)	4,500	
OC170	p-n-p	50†	−20	10	−6	0	—	—	—	100	1.5	70,000§	Collector lead stands apart, shield base emitter
OC171	p-n-p	50†	−20	10	−5	0	—	—	—	100	1.5	70,000§	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
MULLARD *(Continued)*													
Current Types (Continued)													
OC200	p-n-p	210†	−25	50	−6	1	25	125	—	20	0.001 (V_c=−10)	1,000	Base centre lead Collector coded red
OC201	p-n-p	210†	−25	50	−6	1	25	125	—	30	0.001 (V_c=−10)	4,000	
OC202	p-n-p	210†	−15	50	−6	1	25	300	—	70	0.001 (V_c=−10)	4,000	
OC203	p-n-p	210†	−60	50	−6	1	25	125	—	15	0.001 (V_c=−10)	1,000	
OC204	p-n-p	300	−32	125	−6	1	25	100	—	40	0.001 (V_c=−10)	1,500	
OC205	p-n-p	210†	−60	250	−6	1	25	100	—	40	0.001	1,500	
OC206	p-n-p	210†	−32	250	−6	1	25	100	—	40	0.001	2,000	

† At $T_{ambient}$ = 45°C.
†† The maximum collector voltage in earthed emitter circuits depends upon external base to emitter resistance, and values quoted are applicable if R_b> values given in brackets.
* On heat sink of thermal conductivity θh = 3.5°C/W.
** Large signal current amplification (a').
‡‡ With cooling fin mounted on heat sink 3.5×3.5cm or equivalent with a thermal conductivity = 0.3°C/mW.
§ f_1, frequency at which modulus of h_{fe} is equal to unity.
h_{fe} is small-signal fwd. I transfer ratio with o.p. short-circuited to a.c.
§§ T network parameters.

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
NEWMARKET—PYE													
Current Types													
V6/2R	p-n-p	75	6	30**	4.5	1.0	High frequency types			30	1.0	3,000	Base lead central. Collector stands apart
V6/4R	p-n-p	75	6	30**	4.5	1.0				50	1.0	5,500	
V6/8R	p-n-p	75	6	30**	4.5	1.0				80	1.0	10,000	
V6/2RJ	p-n-p	75	6	30**	4.5	1	High frequency types			30	1	3,000	Base lead central. Collector stands apart
V6/4RJ	p-n-p	75	6	30**	4.5	1				50	1	5,500	
V6/8RJ	p-n-p	75	6	30**	4.5	1				80	1	10,000	
V10/15A	p-n-p	125	10	30**	4.5	1.0	Audio frequency types			20	5	600	
V10/30A	p-n-p	125	10	30**	4.5	1.0				40	5	700	
V10/50A	p-n-p	125	10	30**	4.5	1.0				75	5	1,200	
V10/1S	p-n-p	75	10	500	4.5	1.0	Switching transistors			66	1.0	10,000	
V10/2S	p-n-p	75	10	400	4.5	1.0				66	1.0	5,000	
V10/1SJ	p-n-p	75	10	500	4.5	1	Switching types			66	1	10,000	
V10/2SJ	p-n-p	75	10	400	4.5	1				66	1	5,000	
V15/20IP	p-n-p	2,000***	15	2,000**	1.5	20	Intermediate power type			40	20	300	Collector coded white clockwise emitter, base
V15/10P	p-n-p	10,000††	15	3,000**	1.5	200	Power types			18	20	—	Collector 0BA stud. Emitter left screw at top
V15/20P	p-n-p	10,000††	15	3,000**	1.5	200				24	20	—	
V15/30P	p-n-p	10,000††	15	3,000**	1.5	20				38	20	—	
V15/20R	p-n-p	75	15	12**	6	1.0	VHF drift transistor			50	8	40,000	Base lead central. Collector stands apart
V30/20IP	p-n-p	2,000***	30	2,000**	1.5	20	Intermediate power type			40	20	300	Collector coded white, clockwise emitter, base
V30/10P	p-n-p	10,000††	30	3,000**	1.5	200	Power types			18	20	—	Collector 0BA stud. Emitter left
V30/20P	p-n-p	10,000††	30	3,000**	1.5	200				24	20	—	
V30/30P	p-n-p	10,000††	30	3,000**	1.5	200				38	20	—	
V15/10DP	p-n-p	10,000††	15	3,000**	1.5	200				18	20	—	
V15/20DP	p-n-p	10,000††	15	3,000**	1.5	200				24	20	—	
V15/30DP	p-n-p	10,000††	15	3,000**	1.5	200				38	20	—	
V30/10DP	p-n-p	10,000††	30	3,000**	1.5	200				18	20	—	
V30/20DP	p-n-p	10,000††	30	3,000**	1.5	200				24	20	—	
V30/30DP	p-n-p	10,000††	30	3,000**	1.5	200				38	20	—	
V60/20IP	p-n-p	2,000***	60	2,000**	1.5	20	Intermediate power type			40	20	300	Collector coded white, clockwise emitter, base

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
NEWMARKET—PYE (*Continued*)													
Current Types (Continued)													
V60/10P	p-n-p	10,000††	60	3,000**	1.5	200	Power types			18	20	—	Collector 0BA stud. Emitter left
V60/20P	p-n-p	10,000††	60	3,000**	1.5	200				24	20	—	
V60/30P	p-n-p	10,000††	60	3,000**	1.5	200				38	20	—	

‡ On heat sink 7 × 7in. 16 s.w.g. aluminium. †† On heat sink 50 sq. in. 16 s.w.g. aluminium.
*** On heat sink 3 × 3in. 16 s.w.g. aluminium. ** Limited only by max. dissipation and reduction in current gain.

NOTE :—V—/—J Jedec Type T05 outline replacement for V6/—R and V10/—S types.
V—/—DP Jedec Type T03 outline replacement for V—/—P types.

R.C.A.

Current Types

2N104	p-n-p	150	−30	−50	−3	−0.2	—	—	—	44	−10 (Vc=−12)	530	Emitter, base, wide space, collector.
2N105	p-n-p	60	−25	−15	−1.3	−0.3	—	—	—	45	−7 (Vc=−12)	750	Clockwise : collector (dot), emitter, base.
2N109	p-n-p	150	−25	−70	—	—	—	—	—	—	−14 (Vc=−25)	—	Emitter, base, wide space collector.
2N139	p-n-p	80	−16	−15	−9	−0.5	455kc/s amplifier			45	−6 (Vc=−12)	6,800	
2N140	p-n-p	80	−16	−15	−9	−0.6	535—1,640kc/s converter			75	−6 (Vc=−25)	10,000	
2N175	p-n-p	50	−10	−2	−4	−0.5	—	—	—	65	−12 (Vc=−25)	850	
2N176	p-n-p	10,000	−40	−3,000	—	—	—	—	—	—	−3,000 (Vc=−30)	—	Emitter "E", base "B", collector is mounting flange
2N215	p-n-p	150	−30	−50	−6	−1	—	—	—	44	−10 (Vc=−12)	530	Clockwise : emitter, base, collector, gap.
2N217	p-n-p	150	−25	−70	—	—	—	—	—	—	−14 (Vc=−25)	—	
2N218	p-n-p	80	−16	−15	−9	−0.5	455kc/s amplifier			45	−6 (Vc=−12)	6,800	
2N219	p-n-p	80	−16	−15	−9	−0.6	535—1,640kc/s converter			75	−6 (Vc=−12)	10,000	
2N220	p-n-p	50	−10	−2	−4	−0.5	—	—	—	65	−12 (Vc=−25)	850	
2N247	p-n-p	80	−35	−10	−9	−1	Drift type			60	−16 (Vc=−30)	30,000	Emitter, base, shield, wide space, collector.
2N269	p-n-p	120	−25	−100	—	—	Medium-speed switching—				−5 (Vc=−12)	—	Clockwise : emitter, base, collector, gap.
2N270	p-n-p	250	−25	−150	—	—	—	—	—	—	−16 (Vc=−25)	—	Emitter, base, shield, wide space, collector
2N274	p-n-p	120	−40	−10	−12	−1.5	Drift type			60	−12 (Vc=−12)	30,000	Clockwise : emitter, base, collector, gap. Shield, centre.
2N301	p-n-p	11,000§	−40	−3,000	—	—	—	—	—	—	−100 (Vc=−0.5)	—	Emitter "E", base "B", collector is mounting flange
2N301-A	p-n-p	11,000§	−60	−3,000	—	—	—	—	—	—	−100 (Vc=−0.5)	—	
2N331	p-n-p	200	−30	−200	−3	−0.5	—	—	—	42	−16 (Vc=−30)	1,160	Clockwise, emitter, base, collector, gap.
2N351	p-n-p	10,000§	−40	−3,000	—	—	—	—	—	—	−3,000 (Vc=−30)	—	Emitter "E", base "B", collector is mounting flange

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
R.C.A. (*Continued*)													
Current Types (Continued)													
2N370	p-n-p	80	−24	−10	—	—	Drift type			60	−10 (Vc=−12)	—	Emitter, base, shield, wide space, collector
2N371	p-n-p	80	−24	−10	—	—	Drift type			—	−10 (Vc=−12)	30,000	
2N372	p-n-p	80	−24	−10	—	—	Drift type			60	−10 (Vc=−12)	—	
2N373	p-n-p	80	−24	−10	—	—	Drift type			60	−8 (Vc=−12)	30,000	
2N374	p-n-p	80	−25	−10	—	—	535—1,640kc/s converter			60	−8 (Vc=−12)	30,000	
2N376	p-n-p	10,000	−40	−3,000	—	—	—	—	—	—	−3,000 (Vc=−30)	—	Emitter "E", base "B", collector is mounting flange
2N384	p-n-p	120	−40	−10	−12	−1.5	V.h.f. amplifier			60	−12 (Vc=−12)	100,000	Clockwise, emitter, base, collector, gap. Shield, centre.
2N398	p-n-p	50	−105	−100	—	—	Low-speed switching			—	−14 (Vc=−2.5)	—	Clockwise, emitter, base, collector, gap
2N404	p-n-p	120	−25	−100	—	—	Medium-speed switching			—	−5 (Vc=−12)	12,000	Clockwise, emitter, base, collector, shield. Index tab between shield and emitter
2N405	p-n-p	150	−20	−35	−6	−1	A.f. driver			35	−14 (Vc=−12)	—	Emitter, base, wide space, collector
2N406	p-n-p	150	−20	−35	−6	−1	A.f. driver			35	−14 (Vc=−12)	—	Clockwise, emitter, base, collector
2N407	p-n-p	150	−20	−70	—	—	—	—	—	—	−14 (Vc=−12)	—	Emitter, base, wide space, collector
2N408	p-n-p	150	−20	−70	—	—	—	—	—	—	−14 (Vc=−12)	—	Clockwise, emitter, base, collector
2N409	p-n-p	80	−13	−15	−9	−0.5	455kc/s amplifier			45	−10 (Vc=−12)	6,800	Emitter, base, wide space, collector
2N410	p-n-p	80	−13	−15	−9	−0.5	455kc/s amplifier			45	−10 (Vc=−12)	6,800	Clockwise, emitter, base, collector
2N411	p-n-p	80	−13	−15	−9	−0.6	535—1,640kc/s converter			75	−10 (Vc=−12)	10,000	Emitter, base, wide space, collector
2N412	p-n-p	80	−13	−15	−9	−0.6	535—1,640kc/s converter			75	−10 (Vc=−12)	10,000	Clockwise, emitter, base, collector
2N544	p-n-p	80	−24	−10	—	—	Drift type			60	−16 (Vc=−12)	30,000	Emitter, base, shield, wide space, collector
2N578	p-n-p	120	−20	−400	—	—	Medium-speed switching			—	−5 (Vc=−12)	5,000	Clockwise, emitter, base, collector, gap
2N579	p-n-p	120	−20	−400	—	—	Medium-speed switching			—	−5 (Vc=−12)	8,000	
2N580	p-n-p	120	−20	−400	—	—	High-speed switching			—	−5 (Vc=−12)	15,000	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
R.C.A. (*Continued*)													
Current Types (Continued)													
2N581	p-n-p	120	−18	−100	—	—	Medium-speed switching	—			−6 (V_c=−6)	8,000	Clockwise, collector, shield, emitter, base.
2N582	p-n-p	120	−25	−100	—	—	High-speed switching	—			−5 (V_c=−12)	18,000	Index tab between shield and emitter
2N583	p-n-p	120	−18	−100	—	—	Medium-speed switching	—			−6 (V_c=−6)	8,000	
2N584	p-n-p	120	−25	−100	—	—	High-speed switching	—			−5 (V_c=−12)	18,000	Clockwise, emitter, base, collector, gap
2N585	n-p-n	120	25	200	—	—	Medium-speed switching	—			8 (V_c=12)	5,000	
2N586	p-n-p	250	−45	−250	—	—	Low-speed switching	—			−16 (V_c=−45)	—	Emitter, base, shield, wide space, collector
2N591	p-n-p	50††	−32	−40	—	—	A.f. driver	—			−7 (V_c=−1)	—	Clockwise, emitter, base, collector, gap
2N640	p-n-p	80	−34	−10	—	—	Drift type	60			−5 (V_c=−12)	42,000	
2N641	p-n-p	80	−34	−10	—	—	Drift type	60			−7 (V_c=−12)	42,000	Emitter, base, shield, wide space, collector
2N642	p-n-p	80	−34	−10	—	—	535−1,640 kc/s converter	60			−7 (V_c=−12)	42,000	
2N643, 2N644, 2N645	p-n-p	120	−30	−100	—	—	High-speed switching	—			−10 (V_c=−7)	45,000	Clockwise, collector, shield, emitter, base. Tab between shield and em.
2N647	n-p-n	100	25	100	—	—	For Class B complimentary symmetry with 2N217	70			14 (V_c=25)	—	Clockwise, emitter, base, collector, gap
2N649	n-p-n	100	20	100	—	—	For Class B complimentary symmetry with 2N408	65			14 (V_c=25)	—	
2N1010	n-p-n	—	10	2	—	—	Low noise	35			10 (V_c=10)	2,000	
2N1023	p-n-p	120	−40	−10	—	—	Drift type	60			—	120,000	Clockwise, emitter, base, collector, gap Shield centre
2N1066	p-n-p	120	−40	−10	—	—	Drift type	60			−12 (V_c=−12)	120,000	Clockwise, collector, shield, emitter, base. Tab between shield and em.
2N1090	n-p-n	120	25	400	—	—	Medium-speed switching	—			8 (V_c=12)	7,000	
2N1091	n-p-n	120	25	400	—	—	Medium-speed switching	—			8 (V_c=12)	13,000	
2N1177	p-n-p	80	−30	−10	—	—	F.m. amplifier	100			−12 (V_c=−12)	140,000	
2N1178	p-n-p	80	−30	−10	—	—	F.m. oscillator	40			−12 (V_c=−12)	140,000	
2N1179	p-n-p	80	−30	−10	—	—	F.m. mixer	80			−12 (V_c=−12)	140,000	Clockwise, emitter, base, collector
2N1180	p-n-p	80	−30	−10	—	—	F.m. i.f. amplifier	80			−12 (V_c=−12)	100,000	
2N1183	p-n-p	1,000	−45	−3,000	—	—	Power switching	—			−30 (V_c=−1.5)	500	
2N1183-A	p-n-p	1,000	−60										
2N1183-B	p-n-p	1,000	−80										
2N1184	p-n-p	1,000	−45	−3,000	—	—	Power switching	—			−30 (V_c=−1.5)	500	Clockwise, emitter, base, collector
2N1184-A	p-n-p	1,000	−60										
2N1184-B	p-n-p	1,000	−80										

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
R.C.A. (*Continued*)													
Current Types (Continued)													
2N1224	p-n-p	120	−40	−10	—	—	V.h.f. amplifier			60	−12‡	30,000	Clockwise, collector, shield, emitter, base. Index tab between shield and emitter Emitter, base, shield, wide space, collector
2N1225	p-n-p	120	−40	−10	—	—	Drift type			60	−12‡	100,000	
2N1226	p-n-p	120	−60	−10	—	—	Drift type			60	−12‡	30,000	
2N1300	p-n-p	150	−13	−100	—	—	High-speed switching			—	− 3*	40,000	
2N1301	p-n-p	150	−13	−400	—	—	High-speed switching			—	− 3*	60,000	
2N1395	p-n-p	120	−40	−10	—	—	Drift type			90	−12‡	30,000	
2N1396	p-n-p	120	−40	−10	—	—	Drift type			90	−12‡	100,000	
2N1397	p-n-p	120	−40	−10	—	—	Drift type			90	−12‡	120,000	
2N1425	p-n-p	80	−24	−10	—	—	455kc/s amplifier			—	−16‡	30,000	
2N1426	p-n-p	80	−24	−10	—	—	535−1,640kc/s			100	−16‡	—	

§ At 80°C. †† At 55°C. ‡ At V_c=−12V. * At V_c=0V.

SEMICONDUCTORS

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
Current Types													
2N207	p-n-p	50	12	20			Amplifier, subminiature			35_{min}	15	2,000	As 2N535B
2N499	p-n-p	30§	30	50			Amplifier, oscillator*			—	5_{max}	$120{,}000\dagger_{min}$	Clockwise from gap : emitter, base, collector
2N501	p-n-p	25§	15	50			High-speed switching*			20_{min}(d.c.)	5_{max}	$90{,}000\dagger_{min}$	
2N501A	p-n-p	60	15	50						20_{min}(d.c.)	5_{max}	$180{,}000\dagger_{min}$	
2N502	p-n-p	25§	20	50			Amplifier, 10dB at 200 Mc/s*			9_{min}	5_{max}	220,000†	
2N502A	p-n-p	25	30	—			V.h.f. amplifier*			9_{min}	5_{max}	220,000†	
2N503	p-n-p	25§	20	50			Amplifier, 12.5dB at 100 Mc/s*			9_{min}	5_{max}	170,000†	
2N535B	p-n-p	50	20	20			Low noise, subminiature			35_{min}	10	2,000	Clockwise: line or dot C, B, E.
2N536	p-n-p	50	20	30			Low-level switch, subminiature			100_{min}(d.c.)	10	2,000	
2N597	p-n-p	250	45	400			General purpose, medium-speed switching			40_{min}	25	$3{,}000_{min}$	Clockwise from gap : emitter, base, collector C'wise from gap: E, B, C & case
2N598	p-n-p	250	35	400						70_{min}	25	$5{,}600\dagger_{min}$	
2N599	p-n-p	250	30	400						75_{min}	25	$10{,}000\dagger_{min}$	
2N600	p-n-p	750	35	400						50_{min}	25	$5{,}600\dagger_{min}$	
2N601	p-n-p	750	30	400			Core driving, medium-speed switching			40_{min}	5	$10{,}000\dagger_{min}$	
2N671	p-n-p	1,000	40	2,000			Pulse amplification			40_{min}	75	500_{min}	Clockwise from gap : E & case, B, C
2N675	p-n-p	1,000	40	2,000						40_{min}	100	400_{min}	
2N1123	p-n-p	750	45	400			Medium-speed switching			40_{min}	5	3,000	As 2N600
2N1158	p-n-p	60	20	10			Oscillator, 25mW at 200 Mc/s*			5_{min}	25	—	
2N1499A	p-n-p	60	20	50			High-speed switching*			20_{min}(d.c.)	3	—	
2N1500	p-n-p	50	15	50						20_{min}(d.c.)	5	120,000†	
2N1727	p-n-p	60	20	50			Amplifier*			20_{min}	10_{max}	$50{,}000\ddagger_{min}$	
2N1728	p-n-p	60	20	50			Amplifier, 40dB at 455 kc/s*			25_{min}	10_{max}	$50{,}000\ddagger_{min}$	
2N1742	p-n-p	60	15	—			Amplifier, 16dB at 200 Mc/s*			10_{min}	10_{max}	1,300,000‡	
2N1743	p-n-p	60	15	—			V.h.f. mixer*			—	10_{max}	—	
2N1744	p-n-p	60	15	—			V.h.f. oscillator*			—	10_{max}	—	
2N1745	p-n-p	60	20	—			I.f. amplifier, 45 Mc/s*			—	10_{max}	—	
2N1747	p-n-p	30	25	—			Amplifier, 28dB at 10.7 Mc/s*			10_{min}	10_{max}	—	
2N1748	p-n-p	30	25	50			Video*			50_{min}	10_{max}	$50{,}000\ddagger_{min}$	
2N1749	p-n-p	35	30	10			Video output*			30_{min}	10_{max}	$50{,}000\ddagger_{min}$	Clockwise from gap : emitter, base, collector
2N1750	p-n-p	30	12	50			Sync. separator*			50_{min}	10_{max}	$50{,}000\ddagger_{min}$	
MA393	p-n-p	25	6	50			Micro-alloy types, switching amplifier			40_{min}	10_{max}	$25{,}000\ddagger_{min}$	
MAS20	p-n-p	25	6	20						80_{min}(d.c.)	20_{max}	$15{,}000\ddagger_{min}$	
SA495	p-n-p	150	25	50			Silicon surface alloy switching amplifier			9_{min}	0.1_{max}	$8{,}000\ddagger_{min}$	
SA496	p-n-p	150	10	50						6_{min}	0.1_{max}	$7{,}000\dagger_{min}$	
SAA45	p-n-p	150	5	50						18	0.05_{max}	$4{,}000\dagger_{min}$	
SAC40	p-n-p	150	5	50			choppers			—	0.05_{max}	$10{,}000\dagger_{min}$	
SAC42	p-n-p	150	15	50						—	0.05_{max}	$10{,}000\dagger_{min}$	
SAC44	p-n-p	150	5	50						—	0.05_{max}	$4{,}000\dagger_{min}$	
SB128	p-n-p	25	10	5			Surface barrier switching			19_{min}	15_{max}	$27{,}000\dagger_{min}$	
SB240	p-n-p	30	6	15						16_{min}	3_{max}	$25{,}000\dagger_{min}$	
SB344	p-n-p	20**	5	5						11_{min}	3_{max}	$30{,}000\dagger_{min}$	
SB345	p-n-p	20**	5	5			General purpose			25_{min}	3_{max}	$30{,}000\dagger_{min}$	

* Micro-alloy, diffused-base types. § At 45°C. ** At 40°C. †f_T = modulus h_{fe} × measuring frequency. h_{fe} is small-signal fwd. I transfer ratio with o.p. short-circuited to a.c. ‡ f_{max} = maximum frequency for oscillation.

S.T.C.

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
Replacement Types													
TJ1	p-n-p	200	>20*	50	1.5	2	15	350	30	20	10_{max}†	500	Emitter : red Base : green Collector : black
TJ2	p-n-p	200	>20*	50	1.5	2	15	650	25	40	10_{max}†	600	
TJ3	p-n-p	200	>20*	50	1.5	2	15	850	17.5	60	10_{max}†	800	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
S.T.C. (*Continued*)													
Replacement Types (Continued)													
TS1	p-n-p	50	>20*	50	1.5	2	15	350	30	20	10_{max}†	500	Collector : white.
TS2	p-n-p	50	>20*	50	1.5	2	15	650	25	40	10_{max}†	600	Coll.-Base-Em. clockwise
TS3	p-n-p	50	>20*	50	1.5	2	15	850	17.5	60	10_{max}†	800	
TS13	p-n-p	70	20	**	9	1	13	1,200	60	55	7_{max}	800	Coll. white.
TS14	p-n-p	70	20	**	9	1	13	950	80	35	7_{max}	700	Base, emitter
TS15	p-n-p	70	45	**	9	1	13	1,050	70	40	7_{max}	750	clockwise.
Current Types													
TK23	p-n-p	200	20	**	12.0	1	—	—	—	50	2	1,000	E, B, C clockwise. Swaged collector
TK28	p-n-p	200	20	**	0.1	3	—	—	—	46	—	—	
TK30	p-n-p	200	10	**	4.5	1	—	—	—	40	0.7	6,000	
TK31	p-n-p	200	5	**	4.5	1	—	—	—	60	0.7	11,000	
TK40	p-n-p	200	20	**	12.0	1	—	—	—	90	1.3	1,800	
TK41	p-n-p	200	20	**	12.0	1	—	—	—	40	1.2	1,100	
TK42	p-n-p	200	15	**	12.0	1	—	—	—	66	1.2	1,200	

* These figures are not max. ratings, but refer to min. collector turnover voltage at $I_b=0$. † $V = -10V$.
** Limited only by collector dissipation and the fall in current gain at high currents.

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
TEXAS													
Current Types													
2G101	p-n-p	60	15	10	6	2	15dB power gain at 100 Mc/s			20	1	450,000	Reading clockwise from tab : emitter, base, collector, collector to case.
2G102	p-n-p	60	15	10	6	2	Low-noise version of 2G101			20	1	450,000	
2G103	p-n-p	150	15	50	5	10	Rise-time is 4mμs			50	0.3	300,000	
2G104	p-n-p	150	15	50	5	10				50	0.3	300,000	
2G110	p-n-p	250	36	50	6	10	Power output at 100 Mc/s=150mW			20	1	500,000	
2G220	p-n-p	80,000**	40	10,000	6	1,000	Saturation resistance <0.05Ω			40	200	200	When viewed with tags at bottom; emitter is left, base right, and collector case
2G221	p-n-p	80,000**	60	10,000	6	1,000				40	200	200	
2G222	p-n-p	80,000**	80	10,000	6	1,000				40	200	200	
2G223	p-n-p	80,000**	40	15,000	6	1,000				45	200	250	
2G224	p-n-p	80,000**	60	15,000	6	1,000				45	200	250	
2G225	p-n-p	80,000**	80	15,000	6	1,000				45	200	250	
2G226	p-n-p	80,000**	40	20,000	6	1,000				55	200	300	
2G227	p-n-p	80,000**	60	20,000	6	1,000				55	200	300	
2G228	p-n-p	80,000**	80	20,000	6	1,000				55	200	300	
2G229	p-n-p	80,000**	40	25,000	6	1,000	Saturation resistance <0.05Ω			60	200	350	
2G230	p-n-p	80,000**	60	25,000	6	1,000				60	200	350	
2G231	p-n-p	80,000**	80	25,000	6	1,000				60	200	350	
2G240	p-n-p	15,000**	80	3,000	20	500	Rise time <1μs			90	200	15,000	
2G301	p-n-p	75	15	50	6	1	26	90	50	60	1.0	8,000	Clockwise from large gap ; emitter, base, collector.
2G302	p-n-p	75	15	50	6	1	26	90	50	130	1.0	15,000	
2G303	p-n-p	75	15	100	6	1	26	90	50	60	1.0	8,000	
2G304	p-n-p	75	15	100	6	1	26	90	50	130	1.0	15,000	
2N456	p-n-p	50,000**	40	5,000	6	1,000	—	—	—	150	200	200	When viewed with tags at bottom; emitter is left, base right and collector is case.
2N457	p-n-p	50,000**	60	5,000	6	1,000	—	—	—	150	200	200	
2N458	p-n-p	50,000**	80	5,000	6	1,000	—	—	—	150	200	200	
2N696	n-p-n	600	50	—	10	50	Rise-time <0.15μs			70	1.0	70,000	Reading clockwise from tab : emitter, base, collector.
2N697	n-p-n	600	50	—	10	50	Dissipate 2W on heat sink Operate up to 125°C			140	1.0	100,000	
2N706A	n-p-n	300	20	—	10	10	Rise-time <4mμs			60	<0.5	300,000	
2N711	p-n-p	150	12	50	5	10	—	—	—	50	0.3	300,000	
2N715	n-p-n	500	50	—	10	15	Power output at 70 Mc/s=400mW			50	<1.0	200,000	
2N716	n-p-n	500	70	—	10	15	Power output at 70 Mc/s=600mW			50	<1.0	200,000	
2N753	n-p-n	300	20	—	10	10	Rise-time <4mμs			100	<0.5	300,000	
2S001	n-p-n	150	45	25	5	1	For ambient temperatures up to 175°C			14	0.03	>4,000	
2S002 (CV7056)	n-p-n	150	45	25	5	1				25	0.03	>4,000	
2S003 (CV7057)	n-p-n	150	45	25	5	1				25	0.03	>10,000	
2S004 (CV7058)	n-p-n	150	45	25	5	1				50	0.03	>4,000	
2S005 (CV7059)	n-p-n	125	40	20	20	1	Rise-time 0.05μs			100	0.03	30,000	

(Continued)

Type	p-n-p or n-p-n	P_c max. (mW)	V_c max. (V)	I_c max. (mA)	Small Signal Parameters: V_c (V)	I_c (mA)	r_e' (Ω)	r_b' (Ω)	r_c' (kΩ)	a'	I_{co} (μA)	f_{ca} (kc/s)	Connections
TEXAS (*Continued*)													
Current Types (Continued)													
2S012A (CV7061)	n-p-n	60,000**	70	>2,000	15	1,500	For ambient temperatures up to 150°C			40	10	5,000	Base, centre lead ; collector to case
2S013A (CV7066)	n-p-n	60,000**	60	1,500	15	1,500				35	10	5,000	
2S014 (CV7060)	n-p-n	125	40	20	20	1	Rise-time 0.05μs			65	0.03	20,000	As for 2S001
2S017 (CV7062)	n-p-n	4,000**	60	—	30	30	For ambient temperature up to 200°C			20	0.2	3,000	Reading clockwise from tab ; emitter, base, collector (to case).
2S018 (CV7063)	n-p-n	4,000**	100	—	30	30				20	0.2	3,000	
2S019 (CV7064)	n-p-n	4,000**	60	—	30	30				70	0.2	3,000	
2S020 (CV7065)	n-p-n	4,000**	100	—	30	30				70	0.2	3,000	
2S101	n-p-n	300	25	50	5	10	Rise-time 5mμs			40	0.02	200,000	As for 2S020
2S701	n-p-n	100	25	20	5	1	Industrial versions of 2S003 and 2S004			20	0.05	6,000	Reading clockwise from tab ; emitter, base, collector.
2S702	n-p-n									35	0.05	8,000	
3S002	n-p-n	125	60	—	20	1	Silicon tetrode transistors for h.f. amplification			25	0.005	100,000	Reading clockwise from tab ; emitter, base 1, collector, base 2
3S004	n-p-n									25	0.005	150,000	

** When case is maintained at 25°C.

AMPLIFIER TRIODES

Type	Heater: Volts	Heater: Amps	Volts: Anode	Volts: Grid	Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF): c_{gk}	c_{ak}	c_{ga}	Base: Type	Ref.
BRIMAR												
Obsolete Types												
1H5	1.4*	0.05	90	0	0.15	240,000	0.274	1.1	4.6	1.0	IO	91
30	2.0*	0.06	135	−9.0	3.0	10,300	0.9	3.0	2.0	6.0	UX4	1
27	2.5	1.75	250	−21.0	5.2	9,000	1.0	—	—	—	UX5	1
11A2 (DD)	4.0	1.0	200	−2.0	3.0	18,000	2.8	7.0	7.0	5.0	B7	7
6Q7 (DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.0	5.0	1.6	IO	29
6T8 (TD)	6.3	0.45	250	−3.0	1.0	58,000	1.2	1.6	1.0	2.2	B9A	2
7B6 (DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	3.0	2.4	1.6	B8B	2
7K7 (DD)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.6	3.1	2.7	B8B	21
37	6.3	0.3	250	−18.0	7.5	8,400	1.1	—	—	—	UX5	1
75 (DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	4.2	3.4	1.8	UX6	4
76	6.3	0.3	250	−13.5	5.0	9,500	1.45	3.4	5.5	2.2	UX5	1
85 (DD)	6.3	0.3	250	−20.0	8.0	7,500	1.1	—	—	—	UX6	4
12Q7 (DD)	12.6	0.15		Other data as Type 6Q7								
12SL7 (DT)	12.6	0.15		Other data as Type 6SL7								
14B6 (DD)	12.6	0.15		Other data as Type 7B6								
4D1	13.0	0.2	250	−3.0	10.0	10,000	4.0	—	—	—	B7	23
11D3 (DD)	13.0	0.2	250	−2.0	0.4	90,000	1.1	2.0	4.0	2.0	B7	7
11D5 (DD)	13.0	0.15	250	−3.0	3.8	26,700	1.5	—	—	—	B7	7
19T8 (TD)	19.0	0.15		Other data as Type 6T8								
13D1(2SN7)(SQ) (DT)	25.0	0.15		Other data as Type 6SN7								
Replacement Types												
6AV6 (DD)	6.3	0.3	250	−2.0	1.2	62,500	1.6	2.3	1.1	2.1	B7G	19
6C5	6.3	0.3	250	−8.0	8.0	10,000	2.0	4.4	12.0	2.2	IO	20
6N7 (DT)	6.3	0.8	250	−5.0	3.0	23,000	1.6	—	—	—	IO	22
6R7 (DD)	6.3	0.3	250	−9.0	9.5	8,500	1.9	2.6	5.2	2.4	IO	29
6SC7	6.3	0.3	250	−2.0	2.0	53,000	1.325	2.0	3.0	2.0	IO	25
6SL7 (DT)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.15	0.9	3.5	IO	26
6SN7 (DT) 13D2 (SQ)	6.3	0.6	250	−8.0	9.0	7,700	2.6	2.6	0.8	4.1	IO	26
7C6 (DD)	6.3	0.15	250	−1.0	1.3	100,000	1.0	2.4	2.4	1.6	B8B	2
EBC41 (DD)	6.3	0.23	250	−3.0	1.0	54,000	1.3	2.75	1.5	1.3	B8A	9
UBC41 (DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.75	1.5	1.3	B8A	9
Current Types												
5965	6.3	0.45†	150	R_K 220Ω	8.2	7,250	6.5	3.8	a_{t1} 0.5 a_{t2} 0.38	3.0	B9A	1

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Grid	Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF) c_{gk}	c_{ak}	c_{ga}	Base Type	Ref.
BRIMAR *(Continued)*													
Current Types (Continued)													
6AF4A		6.3	0.225	80	−2.4	16.0	2,270	6.6	2.2	0.45	1.9	B7G	60
6AM4		6.3	0.225	200	−1.0	10.0	8,700	9.8	4.4	0.16	2.4	B9A	38
6AT6 / 6066 (SQ)	(DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.3	1.1	2.1	B7G	19
6BQ7A	(DT)	6.3	0.4	150	−2.0	9.0	6,100	6.4	2.85	0.15	1.15	B9A	39
6BR8	(TP)	6.3	0.45	150	−1.0	18.0	5,000	8.5	2.5	0.4	1.8	B9A	67
6C4 / G/6C4 (SQ)		6.3	0.15	250	−8.5	10.5	7,700	2.2	1.8	1.3	1.6	B7G	15
6J5		6.3	0.3	250	−8.0	9.0	7,700	2.6	4.2	5.0	5.0	IO	20
6J6	(DT)	6.3	0.45	100	R_K=50Ω	8.5	7,100	5.3	2.2	0.4	1.6	B7G	17
12AT7 / 6060 (SQ)	(DT)	6.3	0.3†	250	−2.0	10.0	10,000	5.5	2.5	0.4	1.5	B9A	1
12AU7 / 6067 (SQ)	(DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.6	0.5	1.5	B9A	1
12AX7 / 6057 (SQ)	(DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.46	1.7	B9A	1
12BH7	(DT)	6.3	0.6†	250	−10.5	11.5	5,500	3.1	3.0	0.8	2.4	B9A	1
13D3 / 6158 (SQ)	(DT)	6.3	0.6†	250	−4.6	6.0	14,000	2.3	2.3	0.9	2.1	B9A	1
E88CC	(DT)	6.3	0.3	90	−1.2	15.0	2,650	12.5	3.3	0.18	1.4	B9A	39
EABC80/6AK8	(TD)	6.3	0.45	250	−3.0	1.0	58,000	1.2	1.9	1.6	2.2	B9A	2
ECC84/6CW7	(DT)	6.3	0.335	90	−1.5	12.0	4,000	6.0	2.3	0.5	2.3	B9A	28
ECC85	(DT)	6.3	0.435	250	−2.0	10.0	97,000	6.0	3.0	0.18	1.5	B9A	39
ECC88	(DT)	6.3	0.365	90	−1.3	15.0	2,600	12.5	3.3	0.18	1.4	B9A	39
ECF80	(TP)	6.3	0.3	100	−2.0	14.0	4,000	5.0	2.5	1.8	1.5	B9A	25
ECL80/6AB8	(TP)	6.3	0.3	100	−2.3	4.0	12,500	1.4	2.0	0.3	0.9	B9A	13
ECL82/6BM8	(TP)	6.3	0.78	100	0	3.5	27,000	2.5	2.7	4.0	4.0	B9A	37
PCC84/7AN7	(DT)	7.0	0.3	Other data as Type ECC84									
PCF80	(TP)	9.0	0.3	100	−2.0	14.0	4,000	5.0	2.5	1.8	1.5	B9A	25
12AV6	(DD)	12.6	0.15	250	−2.0	1.2	62,500	1.6	2.3	1.1	2.1	B7G	19
12AE6	(DD)	12.6	0.15	12.6	0	0.75	15,000	1.0	1.8	1.1	2.0	B7G	19
12AT6	(DD)	12.6	0.15	Other data as Type 6AT6									
PCL84	(TP)	15.0	0.3	200	−1.7	3.0	16,200	4.0	4.0	2.5	2.7	B9A	53
PCL82	(TP)	16.0	0.3	Other data as Type ECL82									
PCL85	(TP)	18.0	0.3	100	0	10.0	9,100	5.5	3.0	2.5	2.0	B9A	66
HABC80	(TD)	19.0	0.15	Other data as Type EABC80									
COSSOR													
Obsolete Types													
1H5		1.4*	0.05	90	0	0.15	240,000	0.275	1.1	4.6	1.0	IO	91
210DDT	(DD)	2.0*	0.1	100	0	2.3	25,000	1.1	3.0	10.5	1.6	B5	5
210DET		2.0*	0.1	150	−4.5	3.8	13,000	1.1	—	—	—	B4	1
210HF		2.0*	0.1	150	−3.0	1.6	15,800	1.5	—	—	—	B4	1
210HL		2.0*	0.1	150	−3.0	1.6	22,000	1.1	—	—	—	B4	1
210LF		2.0*	0.1	150	−4.5	4.8	10,000	1.4	—	—	—	B4	1
210RC		2.0*	0.1	150	−1.5	0.85	50,000	0.8	5.0	2.0	6.0	B4	1
41FP		4.0	1.0	250	−18.0	19.0	3,600	2.8	6.6	3.0	4.6	B5	1
41MH		4.0	1.0	200	−1.5	3.2	18,000	4.0	9.5	14.0	2.5	B5	1
41MHL		4.0	1.0	200	−3.0	4.0	11,500	4.5	9.5	14.0	2.5	B5	1
41MTA		4.0	1.0	100	0	4.9	18,000	4.0	—	—	—	B5	1
41MTB		4.0	1.0	100	0	3.6	—	2.6	—	—	—	B5	1
41MTL		4.0	1.0	200	−2.5	5.9	15,000	3.0	8.4	8.9	2.6	B5	1
DDT	(DD)	4.0	1.0	200	−3.0	3.0	17,000	2.4	4.0	6.5	1.0	B7	7
12SC7	(DT)	12.6	0.15	250	−2.0	2.0	53,000	1.3	2.2	3.0	2.0	IO	25
12SR7	(DD)	12.6	0.15	250	−9.0	9.5	8,500	1.9	3.6	2.8	2.4	IO	31
13DHA	(DD)	13.0	0.2	250	−1.5	1.0	83,000	1.5	—	—	1.0	B7	7
202DDT	(DD)	20.0	0.2	200	−3.0	3.0	17,000	2.4	4.0	6.5	1.0	B7	7
Replacement Types													
6C5		6.3	0.3	250	−8.0	8.0	10,000	2.0	4.4	12.0	2.2	IO	20
6J5		6.3	0.3	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	IO	20
6Q7	(DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	5.0	3.8	1.4	IO	29
6SL7	(DT)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.15	0.9	3.5	IO	26
6SN7	(DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	2.8	0.8	3.8	IO	26
7C6	(DD)	6.3	0.15	250	−1.0	1.3	100,000	1.0	2.4	3.0	1.4	B8B	2
OM4	(DD)	6.3	0.2	250	−5.0	5.5	15,000	2.2	2.5	3.6	1.4	IO	29
Current Types													
6BQ7A	(DT)	6.3	0.4	150	−2.0	9.0	6,100	6.4	2.6	0.12	1.2	B9A	39
6C4		6.3	0.15	250	−8.5	10.5	7,700	2.2	1.8	1.3	1.6	B7G	15

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Grid	Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF) c_{gk}	c_{ak}	c_{ga}	Base Type	Ref.
COSSOR *(Continued)*													
Current Types (Continued)													
12BH7	(DT)	6.3	0.6†	250	−10.5	11.5	5,500	3.1	3.0	0.8	2.4	B9A	1
EABC80/6AK8	(TD)	6.3	0.45	100	−1.0	0.8	54,000	1.45	1.9	1.4	2.0	B9A	2
EBC41/62DDT	(DD)	6.3	0.23	250	−3.0	1.0	54,000	1.3	2.75	1.5	1.3	B8A	9
ECC81	(DT)	6.3	0.3†	170	−1.5	7.0	12,000	4.8	2.2	0.4	1.5	B9A	1
ECC82	(DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.6	0.5′, 0.35″	1.5	B9A	1
ECC83	(DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.46	1.7	B9A	1
ECC84	(DT)	6.3	0.34	90	−1.5	12.0	4,000	6.0	2.1, 2.3	0.16, 0.45	1.1, 2.3	B9A	28
ECC85/6AQ8	(DT)	6.3	0.435	230	−2.0	10.0	9,700	6.0	3.0	0.18	1.5	B9A	39
ECC91	(DT)	6.3	0.45	100	−0.85	8.5	7,100	5.3	2.2	0.4	1.6	B7G	17
ECL80/6AB8	(TP)	6.3	0.3	100	−2.3	4.0	12,500	1.4	2.0	0.3	0.9	B9A	13
PCC84/7AN7	(DT)	7.0	0.3	90	−1.5	12.0	—	6.0	2.3	0.45	1.1′, 2.3″	B9A	28
PCC89	(DT)	7.2	0.3	90	−1.2	15.0	3,000	12.0	4.0, 6.8	0.4, 0.2	1.7, 3.1	B9A	28
PCC85	(DT)	9.0	0.3	200	−2.1	10.0	8,300	5.8	0.003	0.18	1.5	B9A	39
PCL83	(TP)	12.6	0.3	250	−8.5	10.5	7,700	2.2	2.0	0.35	1.6	B9A	27
PCL84	(TP)	15.0	0.3	200	−1.7	3.0	16,200	4.0	4.0	2.5	2.7	B9A	53
PCL82	(TP)	16.0	0.3	100	0	3.5	28,000	2.5	2.7	4.0	4.0	B9A	37
UCC84	(DT)	21.0	0.3	Other data as Type PCC84								B9A	28
UCC85	(DT)	26.0	0.1	Other data as Type PCC85								B9A	39
UCL83	(TP)	40.0	0.1	200	−1.5	2.4	34,000	2.5	—	—	—	B9A	27
UCL82	(TP)	50.0	0.1	100	0	3.5	28,000	2.5	2.7	4.0	4.0	B9A	37
PCL85	(TP)	18.0	0.3	100	0	10.0	9,000	5.5	—	—	—	B9A	66
EDISWAN MAZDA													
Obsolete Types													
H141D	(SD)	1.4*	0.05	90	−0.6	0.1	260,000	0.25	1.8	6.0	2.3	MO	6
HL2		2.0*	0.1	150	−2.0	2.0	24,000	1.35	3.0	5.25	4.5	B4	1
HL21DD	(DD)	2.0*	0.15	150	−2.0	2.0	25,000	1.3	2.5	7.0	3.5	B5	5
HL22		2.0*	0.1	150	−2.0	2.0	25,000	1.3	2.75	5.0	4.5	MO	2
HL22DD	(DD)	2.0*	0.1	150	−2.0	2.0	25,000	1.3	2.25	6.75	3.25	MO	7
HL23		2.0*	0.05	150	−2.4	1.5	27,000	1.2	2.75	5.25	5.0	MO	2
HL23DD	(DD)	2.0*	0.05	150	−2.8	1.5	24,000	1.05	2.0	6.0	3.5	MO	7
L2		2.0*	0.1	150	−3.8	4.0	12,500	1.5	3.75	5.25	4.75	B4	1
L21DD	(DD)	2.0*	0.1	150	−4.2	4.0	12,000	1.55	2.25	6.75	3.25	B5	5
L22DD	(DD)	2.0*	0.1	150	−4.2	4.0	12,000	1.55	2.25	6.75	3.25	MO	7
AC/2HL		4.0	1.0	200	−1.75	4.9	15,000	5.0	9.0	6.0	6.5	B5	1
AC/HL		4.0	1.0	200	−3.5	5.0	12,500	2.8	8.0	11.5	3.25	B5	1
AC/HLDD	(DD)	4.0	1.0	200	−3.0	4.3	14,500	2.5	5.0	9.75	2.0	B7	7
AC/HL/DDD	(TD)	4.0	1.0	200	−3.0	4.9	13,500	2.6	3.75	9.5	2.0	B9	5
AC/P4		4.0	1.0	700	For electrostatic scanning					8.4	4.4	5.7	B5	9
HL41		4.0	0.65	250	−4.5	7.0	11,500	3.1	5.25	4.5	5.25	MO	16
HL41DD	(DD)	4.0	0.65	250	−5.2	6.0	13,500	2.2	3.5	4.5	3.5	MO	10
HL42DD	(DD, VM)	4.0	0.65	65	−1.25	2.8	12,500	1.85	3.5	4.5	3.5	MO	10
P41		4.0	0.95	250	−11.8	16.0	3,700	4.5	7.0	4.75	3.5	MO	16
V312		4.0	0.65	250	−4.8	6.0	13,000	2.3	4.5	4.5	2.2	B5	13
6F11	(P)	6.3	0.2	100	−1.8	5.75	9,000	2.85	—	—	—	B8A	8
P61		6.3	0.6	250	−11.8	16.0	3,700	4.5	7.0	4.75	3.5	MO	16
HL133		13.0	0.2	200	−3.3	6.0	12,500	2.9	4.0	5.0	4.75	MO	19
HL133DD	(DD)	13.0	0.2	250	−5.4	6.0	14,000	2.3	3.5	4.5	3.5	MO	10
HL1320		13.0	0.2	200	−3.3	6.0	10,000	3.0	5.0	5.25	2.5	B7	23
HLDD1320	(DD)	13.0	0.2	200	−3.0	4.3	16,000	1.9	4.25	10.5	2.0	B7	7
Replacement Types													
6F1	(P)	6.3	0.35	200	−1.8	12.6	5,300	11.3	—	—	—	B8A	17
6F12	(P)	6.3	0.3	250	−2.0	12.6	8,000	9.4	—	—	—	B7G	21
6F13	(P)	6.3	0.35	200	−1.8	12.6	5,300	11.3	—	—	—	B8A	8
6L1	(DT)	6.3	0.4	250	−11.5	10.0	6,200	2.8	2.8	2.3	2.7	B8A	13
6L18		6.3	0.3	250	−13.3	12.0	3,000	4.8	4.6	5.8	2.2	B8A	6
6L19	(DT)	6.3	0.4	250	−3.1	4.0	20,000	2.75	2.9	2.5	2.5	B8A	13
6L34		6.3	0.3	250	−1.5	10.0	10,500	8.5	5.1	0.1	3.6	B7G	24
6LD3	(DD)	6.3	0.23	100	−0.7	0.8	54,000	1.4	3.0	1.9	1.3	B8A	9
6LD20	(DD)	6.3	0.25	250	−5.9	5.0	13,500	2.3	3.6	3.7	1.5	B8A	9
20L1	(DT)	12.6	0.2	250	−11.5	10.0	6,200	2.8	2.8	2.3	2.7	B8A	13
10LD3	(DD)	13.0	0.1	100	−0.7	0.8	54,000	1.4	3.0	1.9	1.3	B8A	9
10LD11	(DD)	15.0	0.1	250	−5.9	5.0	13,500	2.3	3.6	3.7	1.5	B8A	9
10L1		19.0	0.1	250	−1.5	10.0	10,500	8.5	5.1	0.1	3.6	B7G	24
10F1	(P)	22.0	0.1	200	−1.8	12.6	5,300	11.3	—	—	—	B8A	17
Current Types													
6/30L2	(DT)	6.3	0.3	200	−7.7	10.0	5,300	3.4	2.5	2.1	2.5	B9A	39
6F23	(P)	6.3	0.3	170	−1.9	12.6	4,800	11.6	—	—	—	B9A	10
6F24	(P)	6.3	0.3	170	−1.9	12.7	3,400	19.0	—	—	—	B9A	10

(Continued)

Type	Heater		Volts		Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Grid				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
EDISWAN MAZDA (*Continued*)												
Current Types (Continued)												
6L12 (DT)	6.3	0.435	250	−2.3	10.0	9,700	5.9	3.0	1.2	1.5	B9A	39
6L13 (DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.06	1.7	B9A	1
6LD12 (TD)	6.3	0.45	250	−3.0	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
6LD13 (DD)	6.3	0.2	100	−0.7	0.8	54,000	1.4	2.6	2.9	1.9	B9A	54
6PL12 (T, BT)	6.3	0.78	100	0	3.5	28,000	2.5	2.7	4.3	4.2	B9A	37
30L1 (DT)	7.0	0.3	90	−1.5	12.0	4,000	6.0	2.3	0.5	1.1	B9A	28
30L15 (DT)	7.0	0.3	90	−1.2	15.0	3,100	9.0	3.1	—	—	B9A	28
30F5 (P)	7.3	0.3	170	−1.85	12.6	—	11.0	—	—	—	B9A	10
30FL1 (T, BT)	9.4	0.3	200	−7.7	10.0	5,300	3.4	3.6	2.6	2.7	B9A	49
10LD13 (DD)	13.0	0.1	100	−0.7	0.8	54,000	1.4	2.6	2.9	1.9	B9A	54
30PL1 (T, BT)	13.0	0.3	200	−7.7	10.0	5,300	3.4	2.6	2.0	2.4	B9A	27
30PL12 (T, BT)	16.0	0.3	100	0	3.5	28,000	2.5	2.7	4.0	4.0	B9A	37
30PL13 (T, BT)	16.0	0.3	200	−7.7	10.0	5,300	3.4	2.1	1.9	2.3	B9A	37
30PL14 (T, BT)	16.0	0.3	200	−7.7	10.0	5,300	3.4	2.1	1.9	2.3	B9A	37
10L14 (DT)	26.0	0.1	200	−2.1	10.0	8,300	5.8	3.0	1.2	1.5	B9A	39
10LD12 (TD)	28.0	0.1	200	−2.3	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
10PL12 (T, BT)	50.0	0.1	100	0	3.5	28,000	2.5	3.0	4.3	4.5	B9A	37
EMITRON												
Current Types												
6AT6 (DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.3	1.1	2.1	B7G	19
7C6 (DD)	6.3	0.15	250	−1.0	1.3	100,000	1.0	2.4	2.1	1.5	B8B	2
FERRANTI												
Obsolete Types												
HP2 (DT)	2.0*	0.4	120	0	4.0	8,000	—	—	—	—	B7	11
DA	13.0	0.2	200	−2.6	3.7	20,000	2.2	7.1	6.7	3.5	B7	23
HAD (DD)	13.0	0.2	200	−2.0	4.5	18,000	2.9	—	—	—	B7	7
Replacement Types												
1G6 (DT)	1.4*	0.1	90	0	1.0	45,000	0.68	—	—	—	IO	96
1H5 (SD)	1.4*	0.05	90	0	0.15	240,000	0.28	1.1	4.6	1.0	IO	91
HL2	2.0*	0.1	120	−3.0	4.5	10,000	1.4	—	—	—	B4	1
H2D	2.0*	0.1	100	0	3.5	15,000	1.3	—	—	—	B5	5
L2	2.0*	0.1	120	−6.0	7.5	7,000	1.6	—	—	—	B4	1
D4	4.0	1.0	200	−3.0	4.0	12,500	3.3	8.8	10.0	2.4	B5	1
H4D (DD)	4.0	1.0	200	−2.5	5.5	14,500	2.7	3.5	5.5	2.0	B7	7
6A6 } (DT)	6.3	0.8	250	−5.0	3.0	22,600	1.55	—	—	—	{ UX7	5
6N7 }											{ IO	22
6C5	6.3	0.3	250	−8.0	8.0	10,000	2.0	4.4	12.0	2.2	IO	20
6F8 (DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	IO	28
6J5	6.3	0.3	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	IO	20
6J6 (DT)	6.3	0.45	100	−0.85	8.5	7,100	5.3	2.2	0.4	1.6	B7G	17
6Q7 (DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	3.2	5.0	1.5	IO	29
6SQ7 (DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	4.2	3.4	1.8	IO	31
7C6 (DD)	6.3	0.15	250	−1.0	1.3	100,000	1.0	2.4	2.4	1.6	B8B	2
7K7 (DD)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.6	3.1	2.7	B8B	21
EBC41 (DD)	6.3	0.23	250	−3.0	1.0	54,000	1.3	2.75	1.5	1.3	B8A	9
12Q7 (DD)	12.6	0.15	Other data as Type 6Q7									
12SQ7 (DD)	12.6	0.15	Other data as Type 6SQ7									
12SC7 (DT)	12.6	0.15	250	−2.0	2.0	53,000	1.3	2.2	3.0	2.0	IO	25
12SL7 (DT)	12.6	0.15	Other data as Type 6SL7									
UBC41 (DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.75	1.5	1.3	B8A	9
Current Types												
6SL7 (DT)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.15	0.9	3.5	IO	26
6SN7 (DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	2.6	0.8	4.1	IO	26
12AT7/ECC81 (DT)	6.3	0.3†	170	−1.5	7.0	12,000	4.8	2.2	0.4	1.5	B9A	1
12AU7/ECC82 (DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.8	0.37	1.5	B9A	1
12AX7/ECC83 (DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.33	1.7	B9A	1
EABC80 (DT)	6.3	0.45	250	−3.0	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
PCC84/7AN7 (DT)	7.0	0.3	90	−1.5	12.0	4,000	6.0	2.3	0.5	2.3	B9A	28
PCC85/9AQ8 (DT)	9.5	0.3	170	−1.5	10.0	8,000	6.2	0.003	0.18	1.5	B9A	39
UCC85 (DT)	26.0	0.1	200	−2.1	10.0	—	5.8	0.003	0.18	1.5	B9A	39
G.E.C.												
Obsolete Types												
HD22 (DD)	2.0*	0.2	150	−3.0	1.2	18,000	1.5	1.8	15.0	3.6	B5	5
HD23 (DD)	2.0*	0.15	150	−2.0	1.0	28,600	1.4	2.75	10.0	2.5	B5	5
L21	2.0*	0.1	150	−6.0	2.2	8,900	1.8	4.4	3.4	5.9	B4	1
DH42 (DD)	4.0	0.6	150	−3.0	1.1	58,000	1.2	2.5	4.8	2.0	B7	7

(Continued)

Type	Heater		Volts		Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Grid				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
G.E.C. (*Continued*)												
Obsolete Types (Continued)												
H42	4.0	0.6	250	−2.0	1.0	66,000	1.5	2.6	5.3	3.0	B7	23
MH4	4.0	1.0	250	−4.0	5.0	11,100	3.6	7.0	6.5	5.7	B5	1
MH40	4.0	1.0	200	−3.0	2.7	18,750	2.4	6.0	4.0	7.3	B5	1
ML4	4.0	1.0	250	−16.0	14.0	2,860	4.2	7.2	4.5	6.3	B5	1
DH30 (DD)	13.0	0.3	200	−2.0	2.8	18,000	4.5	4.8	2.4	2.86	B7	7
H30	13.0	0.3	250	−1.7	5.5	13,300	6.0	5.0	2.7	3.5	B7	23
L30	13.0	0.3	200	−8.0	25.0	2,860	4.2	5.0	2.7	3.5	B7	16
Replacement Types												
HD14 (SD)	1.4*	0.05	90	0	0.14	240,000	0.28	0.48	3.5	1.1	IO	91
HD24 (DD)	2.0*	0.1	150	−1.5	1.7	28,600	1.4	2.75	10.0	2.5	B5	5
HL2	2.0*	0.1	150	−3.0	1.8	18,000	1.5	8.0	9.0	4.0	B4	1
MHD4 (DD)	4.0	1.0	250	−4.0	4.0	18,200	2.2	2.42	4.6	3.76	B7	7
MHL4	4.0	1.0	250	−8.0	8.0	8,000	2.5	5.4	4.5	3.9	B5	1
B36 (DT)	12.6	0.3	250	−8.0	9.0	7,700	2.6	3.7	1.2	4.5	IO	26
B65 (DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	2.95	0.77	4.15	IO	26
B729 (DT)	6.3	0.3	200	−7.9	10.0	5,300	3.4	2.5	2.1	2.5	B9A	39
DH63 (DD)	6.3	0.3	250	−3.0	1.1	58,000	1.2	2.5	7.0	1.6	IO	29
DH81 (DD)	6.3	0.3	250	−0.68	1.0	58,000	1.2	2.4	1.4	1.7	B8B	12
DL82 (DD, VM)	6.3	0.3	250	−3.0	5.0	17,000	1.4	2.0	1.5	2.0	B8B	12
EABC80/DH719 (TD)	6.3	0.45	250	−3.0	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
EBC41/DH718 (DD)	6.3	0.23	250	−3.0	1.0	54,000	1.3	3.0	1.9	1.3	B8A	9
ECC81/ B309 (DT)	6.3	0.3†	250	−2.0	10.0	10,000	5.5	2.5	0.4	1.6	B9A	1
ECC82/B329/12AU7 (DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.6	0.5	1.5	B9A	1
ECC83/B339/12AX7 (DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.45	1.7	B9A	1
ECC84 (DT)	6.3	0.33	90	−1.5	12.0	4,000	6.0	2.1, 2.3	0.16, 0.45	1.1, 2.3	B9A	28
ECC85/B719 (DT)	6.3	0.435	230	−2.0	10.0	9,700	6.0	3.0	0.18	1.5	B9A	39
EF86/Z729	6.3	0.2	250	−5.0	4.0	16,000	2.0	—	—	—	B9A	23
H63	6.3	0.3	250	−2.0	1.0	66,000	1.5	2.3	3.7	2.5	IO	18
L63	6.3	0.3	250	−8.0	9.0	7,700	2.6	3.8	3.2	4.1	IO	20
L77	6.3	0.15	250	−8.5	10.5	7,700	2.2	1.8	1.3	1.6	B7G	15
B349 (DT)	7.0	0.3	90	−1.2	15.0	3,100	9.0	3.7	—	—	B9A	28
FCL83/LN309 (TP)	12.6	0.3	250	−8.5	10.5	7,700	2.2	1.7	0.3	1.5	B9A	27
DH76 (DD)	13.0	0.16	250	−3.0	1.1	5,800	1.2	1.5	5.0	1.5	IO	29
UBC81/DH119 (DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.3	2.3	1.2	B9A	54
DH101 (DD)	19.0	0.1	250	−3.0	1.0	58,000	1.2	2.4	1.4	1.7	B8B	12
DH107 (DD)	19.0	0.1	250	−3.0	1.0	58,000	1.2	2.0	1.1	1.9	B7G	19
UABC80/DH109 (TD)	28.0	0.1	200	−2.3	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
Current Types												
A1714**	6.3	0.5	250	—	10.0	—	8.5	3.0	1.3	0.9	B7G	81
A2521***	6.3	0.3	250	—	16.0	—	15.0	3.5	0.06	1.6	B9A	70
A2599**	6.3	0.3	250	—	16.0	—	15.0	3.5	0.7	1.1	B9A	71
A2688**	6.3	0.37	200	—	16.0	—	15.0	2.7	0.2	1.1	B7G†	24
EBC90/DH77 (DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.0	1.1	1.9	B7G	19
R5559‡	6.3	0.3	250	—	25.0	—	25.0	12.0	5.0	2.0	B9A	—
R417A**	6.3	0.3	180	—	25.0	—	25.0	6.5	0.35	1.8	B9A	—
PCC84/B319 (DT)	7.0	0.3	—	−1.5	12.0	4,000	6.0	2.3	0.45	—	B9A	28
LN319 (TP)	13.0	0.3	200	−7.9	10.0	5,300	3.4	2.6	2.0	2.4	B9A	27
UBC41/DH118 (DD)	14.0	0.1	250	−3.0	1.0	54,000	1.3	3.0	1.9	1.3	B8A	9
UCC85/B109 (DT)	26.0	0.1	200	−2.1	10.0	—	6.2	0.003	0.18	1.5	B9A	39
UCL82/LN119 (TP)	50.0	0.1	100	0	3.5	28,000	2.5	2.7	4.3	4.2	B9A	37

** V.h.f. *** U.h.f. ‡ Video. † Flying leads.

HIVAC												
Obsolete Types												
XD1.5V	1.5*	0.08	50	0	0.45	50,000	0.4	—	—	—	Sm4	1
XH1.5V	1.5*	0.08	50	0	0.45	50,000	0.5	—	—	—	Sm4	1
XL1.5V	1.5*	0.08	50	−1.0	0.7	20,000	0.6	—	—	—	Sm4	1
XLO1.5V	1.5*	0.08	50	−1.0	0.9	20,000	0.65	—	—	—	Sm4	1
L210	2.0*	0.1	150	−6.0	4.2	7,500	1.6	—	—	—	B4	1
XD2.0V	2.0*	0.08	50	0	0.65	38,000	0.56	—	—	—	Sm4	1
XH2.0V	2.0*	0.08	50	0	0.45	50,000	0.56	—	—	—	Sm4	1
XL2.0V	2.0*	0.08	50	−1.0	1.0	12,500	0.84	—	—	—	Sm4	1

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Grid	Anode Current (mA)	r_a (Ω)	g_m (mA/V)	c_{gk}	c_{ak}	c_{ga}	Base Type	Base Ref.
HIVAC *(Continued)*													
Obsolete Types (Continued)													
XLO2.0V		2.0*	0.08	50	−1.0	1.1	12,500	0.92	—	—	—	Sm4	1
ACDDT	(DD)	4.0	1.0	200	−4.0	5.0	15,000	2.3	2.4	5.1	3.5	B7	7
ACHL		4.0	1.0	200	−2.75	6.0	10,000	3.5	6.8	7.0	5.5	B5	1
12AU7		12.6/6.3	0.3/0.15	250	−8.5	10.5	7,700	2.2	1.6	0.5	1.5	B9A	1
DDT13	(DD)	13.0	0.3	200	−4.0	5.0	15,000	2.3	2.4	5.1	3.3	B7	7
HL13		13.0	0.3	200	−2.75	6.0	10,000	3.5	6.5	6.9	5.5	B7	23
Current Types													
XFR3		1.25*	0.12	135	−5.0	4.0	—	1.65	1.35	3.25	1.3	B5A	4
XR8		6.3	0.15	100	−2.5	8.0	4,750	4.2	—	—	—	B8D	8
MARCONI													
Obsolete Types													
HD14	(SD)	1.4*	0.05	90	0	0.14	240,000	0.28	0.48	3.5	1.1	IO	91
HD22	(DD)	2.0*	0.2	150	−3.0	1.2	18,000	1.5	1.8	15.0	3.6	B5	5
HD23	(DD)	2.0*	0.15	150	−2.0	1.0	28,600	1.4	2.75	10.0	2.5	B5	5
L21		2.0*	0.1	150	−6.0	2.2	8,900	1.8	4.4	3.4	5.9	B4	1
DH42	(DD)	4.0	0.6	250	−3.0	1.1	58,000	1.2	2.5	4.8	2.0	B7	7
H42		4.0	0.6	250	−2.0	1.0	66,000	1.5	2.6	5.3	3.0	B7	23
MH40		4.0	1.0	200	−3.0	2.7	18,750	2.4	6.0	4.0	7.3	B5	1
ML4		4.0	1.0	250	−16.0	14.0	2,860	4.2	7.2	4.5	6.3	B5	1
DH81	(DD)	6.3	0.3	250	−0.68	1.0	58,000	1.2	2.4	1.4	1.7	B8B	12
DL82	(DD, VM)	6.3	0.3	250	−3.0	5.0	17,000	1.4	2.0	1.5	2.0	B8B	12
DH30	(DD)	13.0	0.3	200	−2.0	2.8	18,000	4.5	4.8	2.4	2.86	B7	7
H30		13.0	0.3	250	−1.7	5.5	13,300	6.0	5.0	2.7	3.5	B7	23
L30		13.0	0.3	200	−8.0	25.0	2,860	4.2	5.0	2.7	3.5	B7	16
DH101	(DD)	19.0	0.1	250	−3.0	1.0	58,000	1.2	2.4	1.4	1.7	B8B	12
Replacement Types													
HD24	(DD)	2.0*	0.1	100	0	0.4	28,600	1.4	2.75	10.0	2.5	B5	5
HL2		2.0*	0.1	150	0	1.75	18,000	1.5	8.0	9.0	4.0	B4	1
MH4Met		4.0	1.0	200	−3.0	4.7	11,100	3.6	7.0	6.5	5.7	B5	1
MH41		4.0	1.0	200	−1.5	5.2	13,300	6.0	8.5	4.1	3.2	B5	1
MHD4Met	(DD)	4.0	1.0	200	−4.0	4.0	18,200	2.2	2.42	4.6	3.76	B7	7
MHL4Met		4.0	1.0	200	−5.0	9.0	8,000	2.5	5.4	4.5	3.9	B5	1
DL63	(DD)	6.3	0.3	250	−3.0	—	22,500	1.6	1.5	3.5	2.3	IO	29
H63		6.3	0.3	250	−2.0	1.0	66,000	1.5	2.3	3.7	2.5	IO	18
DH76	(DD)	13.0	0.16	175	−1.3	0.4	58,000	1.2	1.5	5.0	1.5	IO	29
Current Types													
B65	(DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	2.95	0.77	4.15	IO	26
DH63	(DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.5	7.0	1.6	IO	29
DH77/6AT6	(DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.0	1.1	1.9	B7G	19
DH149/7C6	(DD)	6.3	0.15	250	−1.0	1.3	100,000	1.9	2.4	3.0	1.4	B8B	2
EABC80/DH719	(TD)	6.3	0.45	250	−3.0	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
EBC33/DH147	(DD)	6.3	0.2	250	−5.5	5.0	15,000	2.0	—	—	—	IO	29
EBC41/DH150	(DD)	6.3	0.23	250	−3.0	1.0	54,000	1.3	—	—	—	B8A	9
ECC81/B309	(DT)	6.3	0.3†	250	−2.0	10.0	11,000	5.5	2.5	0.4	1.6	B9A	1
ECC82/B329	(DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.6	0.5	1.5	B9A	1
ECC83/B339	(DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.46	1.7	B9A	1
ECC85/B719	(DT)	6.3	0.435	250	−2.3	10.0	9,600	5.9	3.0	0.18	1.5	B9A	39
ECL80/LN152	(TP)	6.3	0.3	100	−2.3	4.0	19,000	1.4	2.0	0.3	0.9	B9A	13
EF86/Z729		6.3	0.2	250	−2.0	3.0	16,000	2.0	—	—	—	B9A	23
L63		6.3	0.3	250	−8.0	9.0	7,700	2.6	3.8	3.2	4.1	IO	20
L77		6.3	0.15	250	−8.5	10.5	7,700	2.2	1.8	1.3	1.6	B7G	15
PCC84/B319	(DT)	7.0	0.3	90	−1.5	12.0	4,000	6.0	2.3	0.45	—	B9A	28
12AT6	(DD)	12.6	0.15	100	−3.0	0.8	54,000	1.3	2.3	1.1	2.1	B7G	19
B36	(DT)	12.6	0.3	250	−8.0	9.0	7,700	2.6	3.7	1.2	4.5	IO	26
PCL83/LN309	(TP)	12.6	0.3	250	−8.5	10.5	—	2.2	—	—	—	B9A	27
UBC41/DH142	(DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.75	1.5	1.3	B8A	9
DL145	(DD)	15.0	0.1	150	−2.25	1.25	47,000	3.4	3.6	3.7	1.5	B8A	9
PCL82	(TP)	16.0	0.3	100	0	3.5	28,000	2.5	2.7	4.0	4.0	B9A	37
DH107	(DD)	19.0	0.1	250	−3.0	1.0	58,000	1.2	2.0	1.1	1.9	B7G	19
UCC85	(TD)	26.0	0.1	200	−2.1	10.0	8,300	5.8	0.003	0.008	0.008	B9A	39
UABC80	(DT)	28.0	0.1	200	−2.3	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
UCL83	(TP)	38.0	0.1	170	−9.5	30.0	5,500	5.5	2.3	0.32	1.6	B9A	27
MULLARD													
Obsolete Types													
DAC1	(SD)	1.4*	0.05	90	0	0.14	240,000	0.275	—	—	—	Ct8	32
DA1		2.0*	0.05	40	− 0.25	0.25	80,000	0.4	3.8	5.4	1.6	Sm4	1
DA2		2.0*	0.05	40	− 2.15	1.25	13,600	0.5	3.4	5.4	1.4	Sm4	1

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Grid	Anode Current (mA)	r_a (Ω)	g_m (mA/V)	c_{gk}	c_{ak}	c_{ga}	Base Type	Base Ref.
MULLARD *(Continued)*													
Obsolete Types (Continued)													
DA3		2.0*	0.055	40	−2.8	1.8	7,600	0.62	—	—	—	Sm4	1
KBC32	(DD)	2.0*	0.05	100	0	2.4	21,000	1.2	1.9	7.0	3.1	IO	88
PMIHF		2.0*	0.1	100	0	2.3	22,500	0.8	—	—	—	B4	1
PMILF		2.0*	0.1	100	0	5.8	12,000	0.9	—	—	—	B4	1
PM2HL		2.0*	0.1	135	−1.5	2.2	21,500	1.4	3.6	5.0	3.2	B4	1
TDD2A	(DD)	2.0*	0.12	135	−1.5	1.95	25,000	1.2	2.5	7.6	3.7	B5	5
164V		4.0	0.65	200	−9.0	12.0	4,700	3.4	8.6	8.4	3.2	B5	1
354V		4.0	0.65	250	−4.5	6.5	11,500	3.5	5.3	4.2	3.3	B5	1
904V		4.0	0.65	200	−2.0	2.0	36,000	2.0	8.8	7.8	3.4	B5	1
TT4		4.0	1.0	250	−16.0	20.0	3,300	3.2	3.7	7.0	3.4	B5	1
TT4A		4.0	1.0	250	−9.0	20.0	4,400	4.1	—	—	—	B5	1
75	(DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	4.2	3.4	1.8	UX6	4
6C5		6.3	0.3	250	−8.0	8.0	10,000	2.0	4.4	12.0	2.2	IO	20
EBC3	(DD)	6.3	0.2	250	−5.5	5.0	15,000	2.0	—	—	—	Ct8	7
EC31		6.3	0.65	250	−16.0	20.0	3,300	3.2	—	—	—	IO	20
EC53		6.3	0.25	200	−3.3	7.5	11,400	2.9	1.3	0.13	1.3	B3G	1
ECC31	(DT)	6.3	0.95	250	−4.6	6.0	14,000	2.3	4.0	1.9	3.4	IO	22
EF37	(P)	6.3	0.2	150	−3.0	6.0	10,000	2.8	—	—	—	IO	8
HL13 } HL13C }		13.0	0.2	200	−3.7	5.0	12,000	3.3	3.9	4.6	3.1	Ct8 / B7	3 / 23
TDD13C	(DD)	13.0	0.2	200	−5.0	4.0	13,500	2.0	3.5	2.9	—	B7	7
Replacement Types													
1H5	(SD)	1.4*	0.05	90	0	0.15	240,000	0.275	1.1	4.6	1.0	IO	91
DAC32	(SD)	1.4*	0.05	90	0	0.15	240,000	0.275	1.3	6.0	1.0	IO	91
DCC90	(DT)	1.4*	0.22†	90	−2.5	3.7	8,300	1.8	0.9	1.0	3.2	B7G	8
TDD4	(DD)	4.0	0.65	250	−7.0	4.0	13,500	2.0	3.5	2.9	—	B7	7
6J5		6.3	0.3	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	IO	20
6Q7	(DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	5.0	3.8	1.4	IO	29
6SN7		6.3	0.6	250	−8.0	9.0	7,700	2.6	2.8	0.8	3.8	IO	26
EBC33	(DD)	6.3	0.2	250	−5.5	5.0	15,000	2.0	—	—	—	IO	29
EBC41	(DD)	6.3	0.23	250	−3.0	1.0	58,000	1.2	2.75	1.5	1.3	B8A	9
EBC90	(DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.3	1.1	2.1	B7G	19
EC52		6.3	0.43	250	−2.6	10.0	9,200	6.5	5.2	1.3	3.1	B9G	3
EC92		6.3	0.15	250	−2.0	10.0	11,000	5.5	2.6	0.24	1.6	B7G	66
ECC32	(DT)	6.3	0.95	250	−4.6	6.0	14,000	2.3	4.3	2.0	4.3	IO	26
ECC33	(DT)	6.3	0.4	250	−4.0	9.0	9,700	3.6	3.5	1.5, 1.2	2.5	IO	26
ECC34	(DT)	6.3	0.95	250	−16.0	10.0	5,200	2.2	3.5	1.8	4.0	IO	26
ECC35	(DT)	6.3	0.4	250	−2.5	2.3	34,000	2.0	3.0	1.0, 1.3	2.5, 3.0	IO	26
ECC40	(DT)	6.3	0.6	250	−5.2	6.0	11,000	2.7	3.0, 2.6	1.15	2.6, 2.7	B8A	13
EF37A	(P)	6.3	0.2	150	−3.0	6.0	10,000	2.8	—	—	—	IO	8
UC92		9.5	0.1	170	−1.0	8.5	11,000	5.9	2.6	0.24	1.6	B7G	66
12Q7	(DD)	12.6	0.15		Other data as Type 6Q7								
12SN7	(DT)	12.6	0.3		Other data as Type 6SN7								
HBC90	(DD)	12.6	0.15		Other data as Type EBC90								
UBC41	(DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.75	1.5	1.3	B8A	9
UCC84	(DT)	21.0	0.1		Other data as Type PCC84								
UCL83	(TP)	40.0	0.1	200	−1.5	2.4	34,000	2.5	2.3	0.32	1.6	B9A	27
Current Types													
PC95		3.6	0.3	200	−1.2	10.0	8,000	10.5	3.1	0.24	0.38	B7G	—
E88CC	(DT)	6.3	0.3	90	−1.0	15.0	—	12.5	3.3	1.18	1.4	B9A	39
E90CC	(DT)	6.3	0.4	100	−2.1	8.5	4,500	6.0	3.4	0.35, 0.4	3.2, 3.5	B7G	17
EABC80	(TD)	6.3	0.45	250	−3.0	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
EAC91 M8097 (SQ)	(SD)	6.3	0.3	200	−3.2	7.5	12,800	2.8	1.7	0.4	1.6	B7G	23
EBC81	(DD)	6.3	0.23	250	−3.0	1.0	58,000	1.2	2.3	2.3	1.2	B9A	54
EBC91	(DD)	6.3	0.3	250	−2.0	1.2	62,500	1.6	—	—	—	B7G	19
EC71 M8718 (SQ)	(DT)	6.3	0.15	100	−1.25	8.5	4,700	5.8	2.2	0.7	1.45	B8D†	16
EC90		6.3	0.15	250	−8.5	10.5	7,700	2.2	1.8	1.3	1.6	B7G	15
EC91 M8099 (SQ)		6.3	0.3	250	−1.5	10.0	12,000	8.5	5.3	0.2	3.8	B7G	24
ECC70 6021 (SQ)	(DT)	6.3	0.3	100	−1.0	6.5	6,500	5.4	2.4	0.3	1.5	B8D†	15
ECC81 M8162 (SQ)	(DT)	6.3	0.3†	170	−1.0	8.5	11,000	5.9	2.3	0.2	1.6	B9A	1
ECC82 M8136 (SQ)	(DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.6	0.5	1.5	B9A	1
ECC83 M8137 (SQ)	(DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.46	1.7	B9A	1
ECC84	(DT)	6.3	0.34	90	−1.5	12.0	4,000	6.0	2.1,2.3	0.16,0.45	1.1,2.3	B9A	28

(Continued)

Type	Heater		Volts		Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Grid				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
MULLARD (*Continued*)												
Current Types (*Continued*)												
ECC85 (DT)	6.3	0.435	250	−2.3	10.0	9,700	5.9	3.0	0.18	1.5	B9A	39
ECC88 (DT)	6.3	0.33	90	−1.2	15.0	2,650	12.5	3.3	1.8	1.4	B9A	39
ECC91 } (DT)	6.3	0.45	100	−0.85	8.5	7,100	5.3	2.2	0.4	1.6	B7G	17
M8081 (SQ) }												
ECL80 (TP)	6.3	0.3	100	−2.3	4.0	12,500	1.4	2.0	0.3	0.9	B9A	13
ECL82 (TP)	6.3	0.78	100	0	3.5	28,000	2.5	2.7	4.3	4.2	B9A	37
ECL83 (TP)	6.3	0.6	200	−1.5	2.5	34,000	2.5	2.3	0.32	1.6	B9A	27
PCC84 (DT)	7.0	0.3	90	−1.5	12.0	4,000	6.0	2.1, 2.3	0.16, 0.45	1.2, 2.3	B9A	28
PCC88 (DT)	7.0	0.3	90	−1.2	15.0	2,650	12.5	3.3	1.8	1.4	B9A	39
PCC89 (DT)	7.2	0.3	90	−1.2	15.0	2,900	12.3	3.8, 6.3	2.5, 0.2	1.9, 4.1	B9A	28
PCC85 (DT)	9.0	0.3		Other data as UCC85								
PABC80 (DD)	9.5	0.3		Other data as Type UABC80							B7G	19
HBC91 (DD)	12.6	0.15	250	−2.0	1.2	62,500	1.6	—	—	—	B9A	27
PCL83 (TP)	12.6	0.3	250	−8.5	10.5	7,700	2.2	2.0	0.35	1.6	B9A	54
UBC81 (DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.3	2.3	1.2	B9A	53
PCL84 (TP)	15.0	0.3	200	−1.7	3.0	16,200	4.0	4.0	2.5	2.7	B9A	37
PCL82 (TP)	16.0	0.3	100	0	3.5	28,000	2.5	2.7	4.0	4.0	B9A	66
PCL85 (TP)	18.0	0.3	100	0	10.0	9,000	5.5	2.8	0.35	1.9	B9A	39
UCC85 (DT)	26.0	0.1	200	−2.1	10.0	8,300	5.8	0.003	0.18	1.5	B9A	2
UABC80 (DT)	28.0	0.1	200	−2.3	1.0	50,000	1.4	1.9	1.4	2.0	B9A	37
UCL82 (TP)	50.0	0.1	100	0	3.5	28,000	2.5	2.7	4.3	4.2	B9A	
											† Flying leads.	
TUNGSRAM												
Obsolete Types												
DDT2 (DD)	2.0*	0.1	135	−3.0	1.0	21,000	1.4	2.0	7.7	2.8	B5	5
DDT2B } (DD)	2.0*	0.1	135	−4.5	2.5	16,000	1.0	—	—	—	B5	5
DDT2BS }											Ct8	28
HL2	2.0*	0.13	135	−1.5	2.2	21,000	1.5	3.9	4.0	3.2	B4	1
HR2 }	2.0*	0.065	135	−1.5	1.2	40,000	0.6	6.5	5.5	2.5	B4	1
HR2S }	2.0*	0.1	200	−1.5	1.0	23,000	1.3	—	—	4.0	Ct8	18
HR210											B4	1
LL2 }	2.0*	0.2	135	−2.5	3.0	11,500	2.6	—	—	—	B4	1
LL2S }											Ct8	18
LD210	2.0*	0.1	150	−4.5	3.0	14,000	1.3	—	—	4.0	B4	1
2A6 (DD)	2.5	0.8	250	−1.35	0.4	91,000	1.1	1.7	3.8	1.7	UX6	4
HL4g	4.0	0.65	250	−4.5	5.0	11,000	3.5	4.9	4.5	1.7	B7	6
6C5	6.3	0.3	250	−8.0	8.0	10,000	2.0	4.4	12.0	2.2	IO	20
6R7 (DD)	6.3	0.3	250	−9.0	9.5	8,500	1.9	4.8	3.8	2.4	IO	29
EBC3 (DD)	6.3	0.2	250	−5.5	5.0	15,000	2.5	4.0	3.1	1.6	Ct8	7
HL13	13.0	0.2	200	−3.0	6.0	11,000	3.5	4.9	5.5	1.7	B7	23
HL13S	13.0	0.2	200	−3.0	6.0	11,000	3.5	4.9	5.5	1.7	Ct8	6
DDT13 } (DD)	13.0	0.2	200	−5.0	4.0	11,000	3.6	4.3	3.1	1.7	B7	7
DDT13S }	25.0	0.15		Other data as Type 6SN7							Ct8	7
25SN7												
Replacement Types	4.0	0.65	250	−4.5	5.0	11,000	3.5	4.9	4.5	3.5	B5	1
HL4+	4.0	0.65	250	−5.0	4.0	11,000	3.6	4.3	3.1	1.7	B7	7
DDT4 (DD)												
Current Types												
75 } (DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	4.2	3.4	1.8	UX6	4
6SQ7 }											IO	31
12AT7 (DT)	6.3	0.3†	170	−1.5	8.5	12,000	5.5	2.2	0.4, 0.5	1.5	B9A	1
12AU7 (DT)	6.3	0.3†	250	−8.5	10.5	7,700	2.2	1.6	0.5	1.5	B9A	1
12AX7 (DT)	6.3	0.3†	250	−2.0	1.2	62,500	1.6	1.6	0.46	1.7	B9A	1
6AB8 (TP)	6.3	0.3	100	−2.3	4.0	12,500	1.4	2.0	0.3	0.9	B9A	13
6AK8 (TD)	6.3	0.45	250	−3.0	1.0	50,000	1.4	1.9	1.6	2.2	B9A	2
6AT6	6.3	0.3	250	−3.0	1.0	58,000	1.2	2.3	1.1	2.1	B7G	19
6AV6	6.3	0.3	250	−2.0	1.2	62,500	1.6	—	—	—	B7G	19
6CV7 (DD)	6.3	0.23	250	−3.0	1.0	54,000	1.3	2.75	1.5	1.3	B8A	9
6J5	6.3	0.3	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	IO	20
6J6 (DT)	6.3	0.45	100	−0.85	8.5	7,100	5.3	2.2	0.4	1.6	B7G	17
6Q7 (DD)	6.3	0.3	250	−3.0	1.0	58,000	1.2	3.2	5.0	1.5	IO	29
6SL7GT (DT)	6.3	0.3	250	−2.0	2.3	44,000	2.0	3.0	1.0, 1.3	2.5, 3.0	IO	26
6SN7 (DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	2.8	0.8	3.8	IO	26
EF37A (P)	6.3	0.2	150	−3.0	6.0	10,000	2.8	—	—	—	IO	8
EAC91	6.3	0.3	200	−2.8	7.5	12,800	2.8	1.7	0.4	1.6	B7G	23
EBC33 (DD)	6.3	0.2	250	−5.5	5.0	15,000	2.5	4.0	3.1	1.6	IO	29
EBC81 (DD)	6.3	0.23	250	−3.0	1.0	58,000	1.2	—	—	—	B9A	54
ECC84 (DT)	6.3	0.335	90	−1.5	12.0	4,000	6.0	2.3	0.5	2.3	B9A	28

(Continued)

Type	Heater		Volts		Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF)			Base	
	Volts	Amps	Anode	Grid				c_{gk}	c_{ak}	c_{ga}	Type	Ref.
TUNGSRAM (*Continued*)												
Current Types (*Continued*)												
7FC7 (DT)	7.2	0.3	90	−1.2	15.0	3,000	12.0	4.0, 6.8	0.4, 0.2	1.7, 3.1	B9A	28
PCC88 (DT)	7.0	0.3	90	−1.2	15.0	2,650	12.5	—	—	—	B9A	39
7AN7 (DT)	7.0	0.3	90	−1.5	12.0	4,000	6.0	2.3	0.45	2.3, 1.1	B9A	28
12AT6	12.6	0.15		Other data as Type 6AT6								
12AV6	12.6	0.15		Other data as Type 6AV6								
12J5	12.6	0.15		Other data as Type 6J5								
12SN7 (DT)	12.6	0.3		Other data as Type 6SN7								
12SQ7 (DD)	12.6	0.15		Other data as Type 6SQ7								
14L7 (DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	2.75	1.5	1.3	B8A	9
UBC81 (DD)	14.0	0.1	170	−1.6	1.5	42,000	1.65	—	—	—	B9A	54
UCC84 (DT)	21.0	0.1	90	−1.5	12.0	4,000	6.0	2.3	0.45	2.37, 1.1	B9A	28
UCC85 (DT)	26.0	0.1	200	−2.1	10.0	8,300	5.8	0.003	0.008	0.008	B9A	39
UABC80 (TD)	28.0	0.1	200	−2.3	1.0	50,000	1.4	1.9	1.4	2.0	B9A	2
S.T.C.												
Current Type												
3A/167M	6.3	0.45	150	−1.5	40	1,000	47	11	2.5	4.0	B8B	56
AMERICAN												
Current Types												
1E4	1.4*	0.05	0	−3.0	1.5	17,000	0.83	2.4	6.0	2.4	IO	81
1G4	1.4*	0.05	90	−6.0	2.3	10,700	0.83	2.2	3.4	2.8	IO	81
1H5 } (SD)	1.4*	0.05	90	0	0.15	240,000	0.28	1.1	4.6	1.0	IO	91
1LH4 }											B8B	26
1LE3	1.4*	0.05	90	−3.0	1.3	19,000	0.76	1.7	3.0	1.7	B8B	36
3A5 (DT)	1.4*	0.22†	90	−2.5	3.7	8,300	1.8	—	—	—	B7G	8
3B7 (DT)	1.4*	0.22†	90	0	5.2	11,350	1.85	R.f. amplifier			B8B	34
3C6 (DT)	1.4*	0.1†	90	0	4.5	11,200	1.3	—	—	—	B8B	35
1B5L } (DD)	2.0*	0.06	135	−3.0	0.8	35,000	0.58	1.6	1.9	3.4	UX6	3
1H6 }											IO	80
1H4	2.0*	0.06	180	−13.5	3.1	10,300	0.9	3.6	5.0	5.5	IO	81
4A6 (DT)	2.0*	0.12†	90	−1.5	1.1	26,600	0.75	—	—	—	IO	95
2A6 (DD)	2.5	0.8	250	−1.35	0.4	91,000	1.1	1.7	3.8	1.7	UX6	4
2B6 (DT)	2.5	2.25	250	−24.0	40.0	5,150	3.5	—	—	—	UX7	4
2C21 (DT)	6.3	0.6	250	−16.5	8.3	7,600	1.4	—	—	—	UX7	15
2C22	6.3	0.3	300	−10.5	11.0	6,600	3.0	2.2	0.7	3.6	IO	107
2C51 (DT)	6.3	0.3	150	−2.0	8.2	—	5.5	2.2	1.0	1.3	B9A	4
6A6 } (DT)	6.3	0.8	250	−5.0	3.0	22,600	1.55	—	—	—	UX7	5
6N7 }											IO	22
6AB4	6.3	0.15	250	−2.0	10.0	10,000	5.5	2.2	0.5	1.5	B7G	45
6AD5	6.3	0.3	250	−2.0	0.9	66,000	—	—	—	—	IO	20
6AE5	6.3	0.3	95	−15.0	7.0	3,500	1.2	—	—	—	IO	20
6AE6 (DT)	6.3	0.15	250	−1.5	6.5	25,000	1.0	—	—	—	IO	23
6AE7 (DT)	6.3	0.5	250	−13.5	5.0	9,300	1.5	3.0	1.8	2.5	IO	24
6AF5	6.3	0.3	180	−18.0	7.0	4,900	1.5	—	—	—	IO	20
6AH6 } (P)	6.3	0.45	150	—	12.5	3,600	11.0	10.0	2.0	0.03	B7G	16
7AC7 }												
6AH7	6.3	0.3	250	−9.0	12.0	6,600	2.4	2.2	3.0	2.2	IO	27
6AQ6 (DD)	6.3	0.15	250	−3.0	1.0	58,000	1.2	—	—	—	B7G	19
6AQ7 (DD)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.3	1.5	2.8	IO	32
6AR7 (SD, R)	6.3	0.3	250	−2.0	1.3	66,500	1.05	1.4	1.0	2.0	IO	33
6B6 (DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	1.7	3.8	1.7	IO	29
6BF6 (DD)	6.3	0.3	250	−9.0	9.5	8,500	1.9	1.8	1.1	2.0	B7G	19
6C7 (DD)	6.3	0.3	250	−9.0	4.5	16,000	1.25	—	—	—	UX7	9
6C8 (DT)	6.3	0.3	250	0	3.2	22,500	1.6	2.6	2.0	2.5	IO	28
6F4	6.3	0.23	80	—	13.0	2,900	5.8	2.0	0.6	1.9	—	—
6F5											IO	18
6SF5 }	6.3	0.3	250	−2.0	0.9	66,000	1.5	4.0	3.6	2.4	IO	21
7B4 }											B8B	15
6F8 (DT)	6.3	0.6	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	IO	28
6J4	6.3	0.4	100	—	10.0	5,000	11.0	5.5	0.24	4.0	B7G	30
6J6 (DT)	6.3	0.45	100	−0.85	8.5	7,100	5.3	2.2	0.4	1.6	B7G	17
6K4	6.3	0.15	200	—	11.5	4,650	3.45	2.4	0.8	2.4	Wires	
6K5	6.3	0.3	250	−3.0	1.1	50,000	1.4	2.4	3.6	2.0	IO	19
6L4	6.3	0.225	80	—	9.5	4,400	6.4	1.8	0.5	1.6	—	—
6L5	6.3	0.15	250	−9.0	8.0	9,000	1.9	3.0	5.0	2.7	IO	20
6N4	6.3	0.2	180	−3.5	12.0	5,300	6.0	3.0	1.6	1.1	B7G	37
6P5	6.3	0.3	250	−13.5	5.0	9,500	1.45	3.4	5.5	2.6	IO	20

(Continued)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Grid	Anode Current (mA)	r_a (Ω)	g_m (mA/V)	Capacitances (pF) c_{gk}	c_{ak}	c_{ga}	Base Type	Base Ref.
AMERICAN *(Continued)*													
Current Types (Continued)													
6Q6	(SD)	6.3	0.15	250	−3.0	1.2	—	1.05	—	—	—	IO	30
6R7 }	(DD)	6.3	0.3	250	−9.0	9.5	8,500	1.9	4.8	3.8	2.4	IO	29
7E6 }												B8B	12
												B9A	7
6S4		6.3	0.6	250	−8.0	26.0	3,600	4.5	—	—	—	IO	34
6S8	(DD, R)	6.3	0.3	250	−2.0	0.9	91,000	1.1	1.2	5.0	2.0	IO	25
6SC7	(DT)	6.3	0.3	250	−2.0	2.0	53,000	1.3	2.2	3.0	2.0	IO	31
6SR7	(DD)	6.3	0.3	250	−9.0	9.5	8,500	1.9	3.6	2.8	2.4	IO	31
6ST7	(DD)	6.3	0.15	250	−9.0	9.5	8,500	1.9	2.8	3.0	1.5	IO	26
6SU7	(DT)	6.3	0.3	250	−2.0	2.3	44,000	1.6	—	—	—	IO	31
6SZ7	(DD)	6.3	0.15	250	−3.0	1.0	58,000	1.2	2.6	2.8	1.1	IO	29
6T7	(DT)	6.3	0.15	250	−3.0	1.2	62,000	1.05	1.8	3.1	1.7	IO	29
6V7	(DD)	6.3	0.3	250	−20.0	8.0	7,500	1.1	1.5	4.3	1.5	IO	29
7A4		6.3	0.3	250	−8.0	9.0	7,700	2.6	3.4	3.6	3.4	B8B	15
7AF7	(DT)	6.3	0.3	250	−10.0	9.0	7,600	2.1	2.2	1.6	2.3	B8B	14
7B6	(DD)	6.3	0.3	250	−2.0	0.9	91,000	1.1	3.0	2.4	1.6	B8B	2
7E5		6.3	0.15	180	−3.0	5.5	12,000	—	3.6	2.8	1.5	B8B	—
7F7	(DT)	6.3	0.3	250	−2.0	2.3	44,000	1.6	2.4	2.0	1.6	B8B	14
7F8	(DT)	6.3	0.3	250	−2.5	10.0	10,400	5.0	2.8	1.4	1.2	B8B	20
7X7	(SD, R)	6.3	0.3	250	−1.0	1.9	67,000	1.5	—	—	—	B8B	22
12AY7		6.3	0.3†	250	−4.0	3.0	—	1.75	1.3	0.6	1.3	B9A	1
12AH7		12.6	0.15	180	−6.5	7.6	8,400	1.9	2.8	2.6	3.0	IO	27
12B6	(SD)	12.6	0.15	250	−2.0	0.9	91,000	1.1	—	—	—	IO	30
12BF6	(DD)	12.6	0.15	250	−9.0	9.5	8,500	1.9	1.8	1.1	2.0	B7G	19
12E5		12.6	0.15	250	−13.5	—	—	1.45	3.4	5.5	2.6	IO	20
12F5		12.6	0.15		Other data as Type 6F5								
12G7	(DD)	12.6	0.15	250	−3.0	—	58,000	1.2	—	—	—	IO	29
12S8	(TD)	12.6	0.15		Other data as Type 6S8								
12SC7	(DT)	12.6	0.15		Other data as Type 6SC7								
12SF5		12.6	0.15		Other data as Type 6SF5								
12SR7	(DD)	12.6	0.15		Other data as Type 6SR7								
12SW7	(DD)	12.6	0.15	250	−9.0	9.5	8,500	1.9	3.0	2.8	2.4	IO	31
12SX7	(DT)	12.6	0.3	250	−8.0	9.0	7,700	2.6	3.0	0.8	3.6	IO	26
14A4		12.6	0.15		Other data as Type 7A4								
14AF7	(DT)	12.6	0.15	250	−10.0	9.0	7,600	2.1	2.2	1.6	2.3	B8B	14
14B6	(DD)	12.6	0.15		Other data as Type 7B6								
14E6	(DD)	12.6	0.15		Other data as Type 7E6								
14F7	(DT)	12.6	0.15		Other data as Type 7F7								
14F8	(DT)	12.6	0.15	250	−2.5	10.0	10,400	5.0	2.8	1.4	1.2	B8B	20
19J6	(DT)	18.9	0.15	100	—	8.5	7,100	5.3	2.0	0.4	1.5	B7G	17
19T8	(TD)	19.0	0.15		Other data as Type 6T8								
26C6	(DD)	26.5	0.07	250	−9.0	9.5	8,500	1.9	1.9	1.4	2.0	B7G	19

SMALL TRANSMITTING VALVES

(Up to 50W anode dissipation)

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	Current (mA) Grid	Drive (W)	Max. Diss. (W)	R.F. Output (W)	Frequency (Mc/s) Full Rating	Frequency (Mc/s) Reduced Rating	Base Type	Base Ref.
BRIMAR																
Obsolete Types																
807	(BT)	6.3	0.9	600	250	−45	100	7.0	3.5	0.2	25.0	40	60	120	UX5	6
6J6	(DT)	6.3	0.45	150	—	−10	30	—	—	0.35	3.0	3.5	80	250	B7G	17
Current Types																
5763 }	(BT)	6.0	0.75	300	250	−60	50	5.0	3.0	0.35	12.0	8	50	175	B9A	11
6062 (SQ) }		6.3	1.25	600	150	−58	112	9.0	2.8	0.2	20.0	52	60	175	IO	134
6146		6.3	0.6†	250	250	−30	28.5	8.0	1.4	7.15	6.3	3.2	75	150	B9A	44
6870 (SQ)		6.3	0.15	300	—	−27	25	—	7.0	0.35	5.0	5.5	70	150	B7G	15
6C4																
COSSOR																
Current Type																
807	(BT)	6.3	0.9	600	250	−45	100	7.0	3.5	0.2	25.0	42.5	60	120	UX5	6

Type		Heater Volts	Heater Amps	Volts Anode	Volts Screen	Volts Grid	Current (mA) Anode	Current (mA) Screen	Current (mA) Grid	Drive (W)	Max. Diss. (W)	R.F. Output (W)	Frequency (Mc/s) Full Rating	Frequency (Mc/s) Reduced Rating	Base Type	Base Ref.
EMITRON																
Current Type																
807	(BT)	6.3	0.9	600	250	−45	100	7.0	3.5	0.2	25.0	40	60	125	UX5	6
ENGLISH ELECTRIC																
Current Types																
3C24	(T)	6.3	3.0	1,000	—	−70	72	—	9.0	1.3	25.0	47	60	100	UX4	9
4D32	(BT)	6.3	3.75	750	300	−100	250	34.0	12.0	1.5	50.0	140	60	—	B7A	—
829B	(DBT)	6.3	2.25†	500	230	−45	230	23.0	15.0	0.9	40.0	83	200	250	B7A	1
832A	(DBT)	6.3	1.6†	500	200	−65	72	14.0	2.6	0.18	15.0	26	200	250	B7A	1
C178A/5894	(DBT)	6.3	1.8†	600	250	−80	200	18.0	7.0	3.0	40.0	90	150	500	B7A	1
C1134	(DBT)	6.3	1.3†	600	250	−60	100	8.0	1.4	1.5	20.0	48	150	600	B7A	1
G.E.C.																
Obsolete Types																
PT15	(BT)	6.0*	1.3	1,000	300	−70	80	23.0	6.0	0.7	30.0	60	20	60	B5	14
DET19	(DT)	6.3	0.8	300	—	−50	80	—	15.0	2.0	5.0	15.9	50	250	UX7	12
DET20	(T)	6.3	0.2	300	—	—	25	—	—	—	3.5	4.25	50	300	IO	107
Replacement Types																
KT8	(BT)	6.3	1.27	600	300	−100	85	6.0	4.0	0.5	25.0	38	25	100	B5	2
TT11	(BT)	6.3	0.8	250	160	−50	30	8.0	1.5	0.12	2.7	4.8	100	200	IO	113
Current Types																
DET18	(T)	5.0	4.0	1,000	—	−87.5	100	—	35.0	6.0	35.0	70	100	150	UX4	20
A2244	(T)	6.3	0.4	350	—	—	510	—	5.0	—	10.0	1.0△	3,000	—	Coaxial	
DET22	(T)	6.3	0.4	350	—	—	40	—	—	—	10.0	3	600	4,000	Coaxial	
DET24	(T)	6.3	1.0	400	—	—	120	—	—	—	20.0	14	500	2,600	Coaxial	
DET29	(T)	6.3	0.5	450	—	—	40	—	6.0	0.5	10.0	3ϕ	3	1.2	Coaxial	
TT15	(DBT)	6.3	1.6	300	175	−50	120	14	2.5	0.3	15.0	24	160	250	B9G	5
TT20	(DT)	6.3	1.3†	500	250	−80	80	8	2.0	3.0	13.0	31	200	400	B7A	1
TT21	(BT)	6.3	1.6	1,250	300	−115	175	20	6.0	1.9	45.0	102	30	—	IO	129
DET28	(T)	7.7*	1.15	600	—	−60	100	—	6.0	1.0	25.0	35	20	—	B9G	12
TT22	(BT)	12.6	0.8	1,250	300	−115	175	20	6.0	1.9	45.0	102	30	—	IO	129
TT12	(BT)	19.0	0.42	600	275	−60	100	12	4.0	0.4	20.0	40	90	130	B9G	8
							ϕ 2,300 Mcs.		△ 1,600 Mcs.							
EDISWAN MAZDA																
Current Types																
S2P20		2.5	0.46†	150	150	−22	40	3.0	1.0	0.07	5.0	3.0	100	—	B9A	63
11E13	(DBT)	6.3	0.83†	300	175	−40	76	3.0	3.0	0.5	10.0	14.0	225	—	B9A	29
MULLARD																
Obsolete Types																
MZ05-20	(T)	6.0	1.0	600	—	−107	80	—	11.0	2.0	20.0	33.5	2	30	B4	1
TZ05-20	(T)	6.0	1.1	600	—	−60	85	—	20.0	2.7	20.0	36	2	30	B4	1
EC52	(T)	6.3	0.43	250	—	−2.6	10	—	—	—	7.0	—	300	400	B9G	3
EC53	(T)	6.3	0.25	250	—	—	12.5	—	3.6	—	2.5	0.5	285	400	B3G	1
PV06-25	(P)	6.3	1.3	600	300	−75	109	11.5	2.0	0.2	25.0	45	20	60	B7	39
QQV04-20	(DBT)	6.3	1.6†	400	145	−45	150	17	4.5	0.23	20.0	44	125	200	IO	114
TD05-12	(T)	6.3	0.75	150	—	—	10	—	1.5	1.5	0.02	12	1,300	—	—	—
TY1-50	(T)	7.5	3.25	1,250	—	−225	90	—	15.0	4.5	50.0	75	20	330	B4	16
PV1-35	(P)	12.0	0.9	1,000	300	−170	97	10	5.0	1.0	35.0	73	20	60	B7	39
Replacement Types																
DL93	(P)	1.4*	0.2	150	135	—	18.3	6.5	0.13	—	2.0	1.2	50	—	B7G	7
EC70	(T)	6.3	0.15	175	—	—	20	—	2.0	—	3.0	0.75	500	—	B8D	8
QQV07-40	(DBT)	6.3	2.5†	750	200	−55	160	30	12.0	0.8	40.0	87	100	250	B7A	1
QQZ04-15	(DBT)	6.3*	0.68	400	200	−80	60	8	3.0	—	12.0	14.5	186	—	B8B	50
QV04-7 }	(BT)	6.3	0.6	300	250	−50	44	6	0.4	—	7.5	7.7	60	150	B9G	6
M8157 (SQ) }																
QV05-25	(BT)	6.3	0.9	600	250	−45	100	7	3.5	0.2	25.0	40	60	75	UX5	6
Current Types																
DC70	(T)	1.25*	0.2	150	—	—	18.7	—	1.3	—	2.4	0.55	500	—	B8D	7
DL70	(P)	1.25*	0.11	150	110	−22	10.5	2.5	0.06	—	1.0	0.45	200	—	B8D	6
DL73	(P)	1.25*	0.2	150	75	−20	18.6	5.6	0.8	—	2.0	1.2	200	—	B8D	6
QV03-12 }	(P)	6.0	0.75	300	250	−60	50	5.0	3.0	0.4	12.0	8.0	30	175	B9A	11
M8096 (SQ) }																

(Continued)

Type	Heater		Volts			Current (mA)			Drive (W)	Max. Diss. (W)	R.F. Output (W)	Frequency (Mc/s)		Base	
	Volts	Amps	Anode	Screen	Grid	Anode	Screen	Grid				Full Rating	Reduced Rating	Type	Ref.
MULLARD (*Continued*)															
Current Types (Continued)															
EC56 (T)	6.3	0.65	220	—	—	30	—	—	—	10.0	0.5	4,000	—	Disc seal	
EC57 (T)	6.3	0.65	220	—	—	60	—	—	—	10.0	1.8	4,000	—	Disc seal	
ECC91 (SQ) } (DT)	6.3	0.45	150	—	−10	30	—	16.0	0.35	3.0	3.5	80	250	B7G	17
M8081 }										6.0	3.1	120	—	B9A	26
EL85 (P)	6.3	0.2	300	175	−30	20.2	3.9	0.9	—	6.0	6.0	490	—	B9A	29
QQV02-6 (DBT)	6.3	0.8†	180	180	−2.5	55	11.0	2.0	1.6	10.0	14.0	225	—	B9A	29
QQV03-10 (DBT)	6.3	0.83†	300	175	−40	76	3.0	3.0	0.5	20.0	48.0	200	600	B7A	1
QQV03-20A (DBT)	6.3	1.3†	600	250	−60	100	8.0	1.4	1.5	40.0	90.0	275	486	B7A	1
QQV06-40A (DBT)	6.3	1.8†	600	250	−80	200	18.0	7.0	3.0	20.0	52.0	60	175	IO	134
QV06-20	6.3	1.25	600	150	−58	112	10.0	5.0	—	5.0	—	2,000	—	Coaxial	
TD03-5	6.3	0.4	250	—	−2.0	10	—	—	0.6	10.0	3.0	1,000	3,000	Coaxial	
TD03-10 (T)	6.3	0.4	250	—	−3.5	20	—	—	—	10.0	3.0	1,000	3,000	Coaxial	
TD03-10F (T)	6.3	0.4	250	—	−3.5	20	—	—	—	10.0	3.0	1,000	3,000	Coaxial	
TD04-20	6.3	1.0	400	—	—	50	—	—	2.0	20.0	13.0	1,000	2,000	Coaxial	
S.T.C.															
Obsolete Types															
4061A (P)	6.3	0.8	500	200	−90	55	35.0	6.0	0.8	10.0	24.0	30	—	UX7	—
3A/154M (T)	6.3	0.43	250	—	−2	12	—	—	—	—	—	—	—	B8B	15
55A/165M (DP)	12.6	1.0	500	200	−80	125	20.0	1.0	—	16.0	47.5	30	60	B8B	38
Replacement Types										2.0	—	350	450	—	
3A/146J (T)	4.0	0.65	350	—	—	—	—	—	—	6.0	1.5	750	850	—	
3A/147J (T)	4.0	0.7	350	—	—	28	—	—	—	40.0	—	—	—	UX4	1
4300A (T)	5.0	1.2	400	—	−89	50	—	—	—	2.0	—	600	—	—	
3A/148J (T)	6.3	0.4	350	—	—	—	—	—	—	10.0	15.0	100	300	UX7	12
4074A (DT)	6.3	0.8	300	—	−50	90	—	17.0	1.0	35.0	52.0	2	10	UX4	1
4043C (T)	7.5	1.2	600	—	−170	130	—	—	—	25.0	40.0	60	—	B8B	65
5B/256M (BT)	19.0	0.3	600	250	−45	100	7.0	3.5	0.2						
Current Types										25.0	53.0	45	—	B5	1
4033L (T)	6.0	1.4	600	—	−65	125	—	30.0	—	12.0	15.5	100	—	B8B	14
33A/158M (DT)	6.3	0.8	300	—	−50	90	—	17.0	1.0	15.0	20.0	150	200	B9G	5
44A/160M (DBT)	6.3	1.6	350	200	−48	45	5.0	1.5	0.3	15.0	16.0	200	—	B8B	54
3B/240M (T)	6.3	1.1	300	—	−10	90	—	35.0	2.5	25.0	40.0	60	—	B8B	66
5B/254M (BT)	6.3	0.9	600	250	−45	100	8.0	4.0	0.3	25.0	40.0	60	—	B8B	65
5B/255M (BT)	6.3	0.9	600	250	−45	100	8.0	4.0	0.3	16.0	13.5	300	420	B9G	10
33B/152M (DT)	6.3	0.92	275	—	−8.5	100	—	13.0	2.0	50.0	70.0	100	300	B4	16
4304CB (T)	7.5	3.2	1,000	—	−170	100	—	22.0	6.0	25.0	40.0	60	—	B8B	65
5B/257M (BT)	12.0	0.47	600	250	−45	100	8.0	4.0	0.3	15.0	16.0	200	—	B8B	54
3B/241M (T)	19.0	0.37	300	—	−10	90	—	35.0	2.5						
TUNGSRAM															
Current Types										2.0	1.2	50	—	B7G	7
3A4 (P)	1.4*	0.2	150	135	—	18.3	6.5	0.13	—	25.0	42.5	60	125	UX5	6
807 (BT)	6.3	0.9	600	275	−90	100	6.5	4.0	0.4	3.0	3.5	80	250	B7G	17
6J6 (DT)	6.3	0.45	150	—	−10	30	—	16.0	0.35						

VALVE RECTIFIERS

Type	Heater		Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base	
	Volts	Amps						Type	Ref.
BRIMAR									
Obsolete Types									
R1	4.0	1.0	F.W.	250–0–250	60	8	100	B4	14
R2	4.0	2.5	F.W.	350–0–350	120	16	30	B4	14
R3	4.0	2.5	F.W.	500–0–500	120	16	150	B4	14
83	5.0*	3.0	F.W.	450–0–450	225	—	50	UX4	3
5Z3	5.0*	3.0	F.W.	450–0–450	225	32	75	UX4	3
80s	5.0	2.0	F.W.	350–0–350	125	32	30	UX4	21
83V	5.0	2.0	F.W.	375–0–375	175	32	100	UX4	22
7Z4	6.3	0.9	F.W.	325–0–325	100	32	75	B8B	1
R17 }	6.3	0.8	H.W.	500	75	32	50	B9A	30
6157 (SQ) }									

(Continued)

Type	Heater		Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base	
	Volts	Amps						Type	Ref.
BRIMAR (*Continued*)									
Obsolete Types (Continued)									
1D6	25.0	0.3	H.W.	250	100	16	50	UX6	14
25RE, 25Y5	25.0	0.3	F.W.	350–0–350	85	—	—	UX6	9
25Z4	25.0	0.3	H.W.	250	100	40	100	IO	111
35RE	35.0	0.3	F.W.	250–0–250	100	—	—	UX6	9
35Z3	35.0	0.15	H.W.	250	100	40	100	B8B	16
1D5	40.0	0.2	H.W.	250	100	16	50	B5	8
R14	52.0	0.3	2 × H.W.	240	400	50	50	IO	52
Replacement Types									
0Z4	—	—	F.W.	300–0–300	75	—	—	IO	57
80	5.0*	2.0	F.W.	350–0–350	125	32	30	UX4	3
5U4	5.0*	3.0	F.W.	450–0–450	225	32	75	IO	60
5Y3	5.0	2.0	F.W.	350–0–350	125	32	30	IO	60
6X5	6.3	0.6	F.W.	325–0–325	70	32	150	IO	54
7Y4	6.3	0.5	F.W.	325–0–325	70	40	525	B8B	1
EZ40	6.3	0.6	F.W.	350–0–350	90	50	300	B8A	14
R18 }	6.3	1.1	H.W.	625	125	8	160	B9A	30
6443 (SQ) }									
UY41	31.0	0.1	H.W.	250	100	50	210	B8A	1
35W4	35.0	0.15	H.W.	117	100	40	57	B7G	33
35Z4	35.0	0.15	H.W.	250	100	40	100	IO	55
Current Types									
5R4	5.0*	2.0	F.W.	750–0–750	250	4	250	IO	60
5V4	5.0	2.0	F.W.	375–0–375	175	32	100	IO	62
5Z4	5.0	2.0	F.W.	350–0–350	125	32	30	IO	62
6X4 }	6.3	0.6	F.W.	325–0–325	70	40	525	B7G	31
6063 (SQ) }									
EZ80/6V4	6.3	0.6	F.W.	350–0–350	90	50	300	B9A	31
EZ81	6.3	1.0	F.W.	350–0–350	150	50	240	B9A	31
HY90	35.0	0.15	H.W.	250	110	100	100	B7G	33
UY85	38.0	0.1	H.W.	250	100	50	210	B9A	18
COSSOR									
Obsolete Types									
4/100BU	4.0*	2.5	F.W.	500–0–500	200	16	75	B4	5
441U	4.0	2.5	F.W.	500–0–500	150	16	75	B4	5
442BU	4.0*	2.5	F.W.	350–0–350	120	16	100	B4	5
460BU	4.0*	2.5	F.W.	500–0–500	120	16	100	B4	5
506BU	4.0*	1.0	F.W.	250–0–250	60	16	100	B4	5
Replacement Types									
225DU	2.0	0.5	V.D.	750	25	2	2,000	B7	31
451U	4.0*	3.5	F.W.	500–0–500	250	16	75	B4	5
80	5.0*	2.0	F.W.	350–0–350	125	10	50	UX4	3
5U4	5.0*	3.0	F.W.	450–0–450	225	32	75	IO	60
5Z4	5.0	2.0	F.W.	350–0–350	125	32	50	IO	62
6X5	6.3	0.6	F.W.	325–0–325	70	8	50	IO	54
27SU	13.2*	0.9†	H.W.	250	250	60	15	IO	106
OM1	30.0	0.2	H.W.	250	120	32	50	IO	55
40SUA	40.0	0.2	H.W.	250	75	32	50	B5	8
Current Types									
431U	4.0	2.5	F.W.	500–0–500	150	16	75	B4	5
52KU	5.0	2.0	F.W.	500–0–500	150	16	75	IO	62
53KU	5.0	2.8	F.W.	500–0–500	250	16	75	IO	62
54KU	5.0	2.0	F.W.	{350–0–350 / 300–0–300}	{250 / 300}	32	100	IO	62
7Y4	6.3	0.5	F.W.	325–0–325	70	8	150	B8B	1
EZ40/66KU	6.3	0.6	F.W.	350–0–350	90	50	300	B8A	14
EZ80/6V4	6.3	0.6	F.W.	350–0–350	90	50	300	B9A	31
EZ81	6.3	1.0	F.W.	350–0–350	150	50	240	B9A	31
PY82/19Y3	19.0	0.3	H.W.	250	180	60	100	B9A	18
PY32	29.0	0.3	H.W.	250	275	100	56	IO	111
UY41/311SU	31.0	0.1	H.W.	250	90	50	160	B8A	5
35Z3	35.0	0.15	H.W.	250	100	16	100	B8B	16
UY85	38.0	0.1	H.W.	250	110	100	100	B9A	18
EDISWAN MAZDA									
Obsolete Types									
UD41	4.0	1.15	V.D.	550	35	2	—	B7	33
UU4	4.0	2.2	F.W.	400–0–400	120	16	—	B4	14
UU10	4.0	2.3	F.W.	500–0–500	180	8	—	B4	14

(Continued)

Type	Heater Volts	Heater Amps	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base Type	Base Ref.
EDISWAN MAZDA (*Continued*)									
Replacement Types									
UU5	4.0	2.3	F.W.	500–0–500	120	8	—	B4	14
UU6	4.0	1.4	F.W.	350–0–350	120	16	—	MO	8
UU7	4.0	2.3	F.W.	350–0–350	180	16	—	MO	8
UU8	4.0	2.8	F.W.	350–0–350	250	16	—	MO	8
UU9	6.3	0.58	F.W.	350–0–350	90	50	300	B8A	14
U201	20.0	0.2	H.W.	250	90	16	47	IO	55
U281	28.0	0.2	H.W.	250	120	16	47	IO	55
U403	40.0	0.2	H.W.	250	120	16	47	MO	18
U404	40.0	0.1	H.W.	250	90	50	180	B8A	1
U4020	40.0	0.2	H.W.	250	120	16	47	B5	8
U801	80.0	0.2	H.W.	250	300	80	47†	IO	117
Current Types									
ESU76	2.0*	7.5	H.W., M.V.	10,000 PIV	250	—	—	Edison Screw	
ESU103	2.5*	5.0	H.W., Xenon	5,000 PIV	500	—	—	UX4	9
ESU866	2.5*	5.0	H.W., M.V.	10,000 PIV	250	—	—	UX4	9
ESU866ES	2.5*	5.0	H.W., M.V.	10,000 PIV	250	—	—	Edison Screw	
19H1	4.0*	2.0	H.W.	5,300	75	0.5	2,500	B4	6
19H5	4.0	4.0	H.W.	6,500	125	2	1,600	Goliath Edison Screw	
								B4	6
ESU101	4.0*	2.7	H.W., M.V.	10,000 PIV	250	—	—	B4	6
UU12	6.3	1.0	F.W.	350–0–350	150	50	240	B9A	31
U192	19.0	0.3	H.W.	250	180	60	100	B9A	18
U291	29.0	0.3	H.W.	250	300	100	35	IO	111
U381	38.0	0.1	H.W.	250	110	100	100	B9A	18

† Each anode.

EMITRON									
Replacement Types									
52KU	5.0	2.0	F.W.	500–0–500	150	16	75	IO	62
53KU	5.0	2.8	F.W.	500–0–500	250	16	75	IO	62
6X4	6.3	0.6	F.W.	325–0–325	70	10	520	B7G	31
7Y4	6.3	0.5	F.W.	325–0–325	70	40	150	B8B	1
27SU	13.2	0.9†	H.W.	250	250	64	15	IO	106
35Z3	35.0	0.15	H.W.	250	100	40	100	B8B	16

FERRANTI									
Obsolete Types									
R4	4.0*	2.5	F.W.	350–0–350	120	32	120	B4	5
R4A	4.0*	2.5	F.W.	500–0–500	120	32	100	B4	5
R13A	13.0	0.3	H.W.	250–0–250	70	8	100	IO	54
RA	13.0	0.3	F.W.	250–0–250	50	8	100	B5	8
RZ	20.0	0.2	H.W.	250	75	16	100	B5	8
Replacement Types									
OZ4	—	—	F.W.	300–0–300	75	—	—	IO	57
R42	4.0	2.5	F.W.	350–0–350	120	16	100	B4	14
R43	4.0*	2.5	F.W.	500–0–500	120	16	100	B4	5
80	5.0*	2.0	F.W.	350–0–350	125	16	50	UX4	3
5U4	5.0*	3.0	F.W.	450–0–450	225	32	75	IO	60
5V4	5.0	2.0	F.W.	375–0–375	175	32	100	IO	62
5Y3	5.0*	2.0	F.W.	350–0–350	125	32	50	IO	60
5Z4	5.0	2.0	F.W.	350–0–350	125	32	50	IO	62
R52	5.0	2.0	F.W.	350–0–350	125	32	50	IO	62
6X5	6.3	0.6	F.W.	325–0–325	70	8	150	IO	54
7Y4	6.3	0.5	F.W.	325–0–325	70	32	150	B8B	1
7Z4	6.3	0.9	F.W.	325–0–325	100	32	75	B8B	1
EY91	6.3	0.42	H.W.	250	75	32	100	B7G	50
EZ40	6.3	0.6	F.W.	350–0–350	90	50	300	B8A	14
UY41	31.0	0.1	H.W.	250	100	50	210	B8A	1
35Z4	35.0	0.15	H.W.	250	100	40	100	IO	55
35Z5	35.0	0.15	H.W.	240	100	40	100	IO	51
PZ30	52.0	0.3	2 × H.W.	240	200	50	50	IO	52
Current Types									
HR6	4.0	1.25	H.W.	5,000	60	2	8,000	IO	22
5R4	5.0*	2.0	F.W.	750–0–750	250	4	250	IO	60
				1,000–0–1,000	150	4	575		
GZ32	5.0	2.3	F.W.	500–0–500	125	60	150	IO	62
EZ80/6V4	6.3	0.6	F.W.	350–0–350	90	50	300	B9A	31
EZ90/6X4	6.3	0.6	F.W.	325–0–325	70	8	150	B7G	31

(Continued)

Type	Heater Volts	Heater Amps	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base Type	Base Ref.
FERRANTI (*Continued*)									
Current Types (*Continued*)									
PY82/19Y3	19.0	0.3	H.W.	250	180	60	45	B9A	18
UY85	38.0	0.1	H.W.	250	110	100	100	B9A	18

G.E.C.									
Obsolete Types									
GU1	4.0*	3.0	H.W., M.V.	1,000	250	—	—	B4	4
GU5	4.0*	3.0	H.W., M.V.	1,500	250	—	—	B4	6
MU12	4.0	2.5	F.W.	350–0–350	120	—	—	B4	5
U12	4.0*	2.5	F.W.	350–0–350	120	4	—	B4	5
U17	4.0*	1.0	H.W.	2,500	30	1	2,000	B4	6
U30	26.0	0.3	F.W.	250–0–250	120	—	—	B7	12
U118	40.0	0.1	H.W.	250	90	40	180	B8A	1
Replacement Types									
MU14	4.0	2.5	F.W.	500–0–500	120	32	100	B4	5
U10	4.0*	1.0	F.W.	250–0–250	100	—	—	B4	5
U14	4.0*	2.5	F.W.	500–0–500	120	32	100	B4	5
U18/20	4.0*	2.8	F.W.	500–0–500	275	16	180	B4	5
U19	4.0	3.3	H.W.	2,500	250	4	600	B4	6
U84	4.0*	1.0	F.W.	250–0–250	75	16	100	B8B	24
U50	5.0*	2.0	F.W.	350–0–350	120	32	100	IO	60
U52	5.0*	2.25	F.W.	500–0–500	250	16	180	IO	60
U54	5.0	2.8	F.W.	500–0–500	250	16	75	IO	62
EZ35	6.3	0.6	F.W.	325–0–325	70	16	250	IO	54
EZ81/U709	6.3	1.0	F.W.	350–0–350	150	8	270	B9A	31
EZ90/U78	6.3	0.6	F.W.	325–0–325	70	16	435	B7G	31
U81	6.3	1.6	F.W.	500–0–500	150	16	100	B8B	24
U82	6.3	0.6	F.W.	325–0–325	75	4	150	B8B	1
PY81	17.0	0.3	—	450	150	4,500	—	B9A	34
PY80/U309	19.0	0.3	—	400	180	650	160	B9A	18
PY82/U319	19.0	0.3	H.W.	250	170	—	55	B9A	18
U31	26.0	0.3	H.W.	250	120	32	100	IO	55
U76	30.0	0.16	H.W.	250	100	32	100	IO	55
PY32	29.0	0.3	H.W.	250	275	100	56	IO	111
U107	40.0	0.1	H.W.	250	90	12	200	B7G	13
U101	50.0	0.1	H.W.	250	100	32	100	B8B	25
Current Types									
GU12	2.5	5.6	H.W., M.V.	3,500	250	—	—	UX4	8
GXU1	2.5	5.0	H.W., Xenon	3,500	250	—	—	UX4	8
GXU5	2.5	30	H.W., Xenon	3,500	3,000	—	—	Special	
GU50	4.0*	3.0	H.W., M.V.	1,750	250	4	—	B4	6
GXU50	4.0	3.0	H.W., Xenon	1,800	250	—	—	B4	5
GXU2	5.0	7.0	H.W., Xenon	4,500	1,250	—	—	B4F	1
GXU52	5.0	2.3	F.W., Xenon	450	250	—	—	B8B	—
A2272	6.3	1.6	H.W.	5,000	100	—	4,000	B8B	—
CV4044	6.3	1.15	H.W.	625	125	—	—	B9A	30
U718	6.3	0.63	F.W.	350–0–350	90	50	300	B8A	14
UY85/U119	38.0	0.1	H.W.	250	110	100	100	B9A	18

HIVAC									
Obsolete Types									
UU60/250	4.0	1.25	F.W.	300–0–300	75	—	—	B4	5
UU120/350A	4.0	2.5	F.W.	350–0–350	120	—	—	B4	5
UU120/500	4.0	2.5	F.W.	500–0–500	120	—	—	B4	5

MARCONI									
Obsolete Types									
GU1	4.0*	3.0	H.W., M.V.	1,000	250	—	—	B4	4
GU5	4.0*	3.0	H.W., M.V.	1,500	250	—	—	B4	6
GU50	4.0*	3.0	H.W., M.V.	1,750	250	4	—	B4	6
U12	4.0*	2.5	F.W.	350–0–350	120	—	—	B4	5
U14	4.0	2.5	F.W.	500–0–500	120	—	—	B4	5
U84	4.0*	1.0	F.W.	250–0–250	75	16	100	B8B	24
U81	6.3	1.6	F.W.	500–0–500	150	16	100	B8B	24

(Continued)

Type	Heater		Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base	
	Volts	Amps						Type	Ref.
MARCONI *(Continued)*									
Obsolete Types (Continued)									
U82	6.3	0.6	F.W.	325–0–325	75	4	150	B8B	1
U154	9.0	0.3	H.W.	250	180	60	100	B9A	18
U30	26.0	0.3	F.W.	250–0–250	120	—	—	B7	12
U107	40.0	0.1	H.W.	250	90	12	200	B7G	13
U101	50.0	0.1	H.W.	250	100	32	100	B8B	25
Replacement Types									
MU14	4.0	2.5	F.W.	500–0–500	120	32	100	B4	5
U10	4.0*	1.0	F.W.	250–0–250	60	—	—	B4	5
U14	4.0*	2.0	F.W.	500–0–500	120	32	100	B4	5
U18/20	4.0*	3.0	F.W.	500–0–500	250	16	180	B4	5
U76	30.0	0.16	H.W.	250	100	32	100	IO	55
Current Types									
AZ31/U143	4.0*	1.1	F.W.	300–0–300	100	16	100	IO	60
U50	5.0*	2.0	F.W.	350–0–350	125	32	100	IO	60
U52	5.0*	3.0	F.W.	450–0–450	225	16	180	IO	60
EZ35/U147	6.3	0.6	F.W.	325–0–325	70	16	350	IO	54
EZ40/U150	6.3	0.6	F.W.	350–0–350	90	50	300	B8A	20
EZ80	6.3	0.6	F.W.	350–0–350	90	50	300	B9A	31
EZ81/U709	6.3	1.0	F.W.	350–0–350	150	—	270	B9A	31
U70	6.3	0.6	F.W.	325–0–325	70	16	350	IO	54
U78/6X4	6.3	0.6	F.W.	325–0–325	70	8	435	B7G	31
U149/7Y4	6.3	0.5	F.W.	325–0–325	70	40	—	B8B	1
PY82/U319	19.0	0.3	H.W.	250	21	—	55	B9A	18
U31	26.0	0.3	H.W.	250	120	32	100	IO	55
PY32	29.0	0.3	H.W.	250	300	100	56	IO	111
UY41/U142	31.0	0.1	H.W.	250	100	50	210	B8A	22
35W4	35.0	0.15	H.W.	250	100	40	120	B7G	33
UY85	38.0	0.1	H.W.	250	110	100	100	B9A	18
U145	40.0	0.1	H.W.	250	90	16	50	B8A	5
MULLARD									
Obsolete Types									
AX50	4.0*	3.75	F.W.	500–0–500	250	16	100	B4	5
DW2	4.0*	1.0	F.W.	250–0–250	60	16	—	B4	5
6X5	6.3	0.6	F.W.	325–0–325	70	4	150	IO	54
CY32	30.0	0.2	2 × H.W.	250	120	32	125	IO	53
UR3C	30.0	0.2	2 × H.W.	250	120	32	125	B7	29
UY21	50.0	0.1	H.W.	250	140	60	175	B8B	4
UY31	50.0	0.1	H.W.	250	125	60	175	IO	55
Replacement Types									
AZ31	4.0*	1.1	F.W.	500–0–500	60	60	—	IO	60
DW4–350	4.0*	2.0	F.W.	350–0–350	120	16	0	B4	5
DW4–500	4.0*	2.0	F.W.	500–0–500	120	16	200	B4	5
FW4–500	4.0*	3.0	F.W.	500–0–500	250	16	200	B4	5
FW4–800	4.0*	3.0	F.W.	850–0–850	125	4	150	B4	5
IW4–350	4.0	2.0	F.W.	350–0–350	120	12	—	B4	14
IW4–500	4.0	2.5	F.W.	500–0–500	120	16	150	B4	14
80	5.0*	2.0	F.W.	350–0–350	125	—	50	UX4	3
5U4	5.0*	3.0	F.W.	450–0–450	225	—	75	IO	60
5V4	5.0	2.0	F.W.	375–0–375	175	—	100	IO	62
5Y3	5.0*	2.0	F.W.	350–0–350	125	—	—	IO	60
5Z4	5.0	2.0	F.W.	350–0–350	125	—	50	IO	62
GZ30	5.0	2.0	F.W.	350–0–350	125	50	380	IO	62
EY70	6.3	0.45	H.W.	235	45	20	270	B8D	11
EY91	6.3	0.42	H.W.	250	75	32	100	B7G	50
EZ41	6.3	0.4	F.W.	250–0–250	60	50	325	B8A	14
EZ35	6.3	0.6	F.W.	325–0–325	70	16	350	IO	54
EZ40	6.3	0.6	F.W.	350–0–350	90	50	300	B8A	14
PY31	17.0	0.3	H.W.	250	125	60	175	IO	55
CY31	20.0	0.2	H.W.	250	120	32	125	IO	55
UR1C	20.0	0.2	H.W.	250	120	32	125	B5	8
25Z4	25.0	0.3	H.W.	250	100	—	—	IO	111
UY41	31.0	0.1	H.W.	250	100	50	210	B8A	1
35Z5	35.0	0.15	H.W.	235	100	40	100	IO	51
UY1N	50.0	0.1	H.W.	250	140	60	175	IO	122
PZ30	52.0	0.3	2 × H.W.	240	200	50	50	IO	52
Current Types									
RG3–250	2.5*	5.0	H.W.	3,500	250	2	—	Edison Screw	
RG3–250A	2.5*	5.0	H.W.	3,500	250	2	—	B4D	1

(Continued)

Type	Heater		Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base	
	Volts	Amps						Type	Ref.
MULLARD *(Continued)*									
Current Types (Continued)									
RR3–250	2.5*	5.0	H.W.	1,700	500	—	—	B4D	1
RG3–1250	4.0*	7.0	H.W.	8,000 PIV	1,250	—	—	Edison Screw	
RG1–240A	4.0*	2.7	H.W.	2,220	250	5	—	B4	6
AZ41	4.0*	0.72	F.W.	300–0–300	70	50	100	B8A	26
GZ32	5.0	2.3	F.W.	500–0–500	125	60	150	IO	62
GZ33	5.0	3.0	F.W.	500–0–500	250	60	250	IO	62
GZ34	5.0	1.9	F.W.	550–0–550	160	60	175	IO	62
GZ37	5.0	2.8	F.W.	500–0–500	250	—	—	IO	62
EY81	6.3	0.8	H.W.	4,500 PIV	150	4	—	B9A	34
EY84	6.3	1.0	H.W.	625	125	24	250	B9A	30
EZ80	6.3	0.6	F.W.	350–0–350	90	50	300	B9A	31
EZ81	6.3	1.0	F.W.	350–0–350	150	50	230	B9A	31
EZ90	6.3	0.6	F.W.	325–0–325	70	16	520	B7G	31
PY82	19.0	0.3	H.W.	200	180	60	30	B9A	18
PY32	29.0	0.3	H.W.	200	325	100	23	IO	111
HY90	35.0	0.15	H.W.	117	100	40	120	B7G	33
UY85	38.0	0.1	H.W.	250	110	100	100	B9A	18
S.T.C.									
Replacement Type									
4274A (DD)	5.0	2.0	F.W.	1,000	175	4	230	UX4	3
Current Types									
866A	2.5	5.0	H.W.	10,000 PIV	250	—	—	UX4	9
3B28	2.5	5.0	H.W.	10,000 PIV	250	—	—	UX4	9
705A	5.0	5.0	H.W.	30,000 PIV	200	—	—	B4A	1
TUNGSRAM									
Obsolete Types									
RG250/3000	2.5*	5.0	H.W.	3,000	250	—	—	UX4	6
RG250/1000	4.0*	3.0	H.W.	1,000	250	4	—	B4	6
RV120/350	4.0*	2.0	F.W.	350–0–350	120	—	—	B4	5
5X4	5.0*	3.0	F.W.	500–0–500	250	—	—	IO	61
5Z3	5.0*	3.0	F.W.	450–0–450	225	—	75	UX4	3
6Z4 } 84 }	6.3	0.5	F.W.	350–0–350	60	—	—	UX5	5
EZ3	6.3	0.65	F.W.	400–0–400	100	—	—	Ct8	14
EZ4	6.3	0.9	F.W.	400–0–400	175	—	—	Ct8	14
PVB6	6.3	0.6	F.W.	400–0–400	100	—	—	B5	3
V2118	20.0	0.18	H.W.	250	80	—	—	B5	9
25Y5	25.0	0.3	2 × H.W.	235	75	—	—	UX6	9
PV25	25.0	0.3	2 × H.W.	250	120	—	—	B7	29
PV29	30.0	0.2	2 × H.W.	125	120	—	100	B7	29
PV30	30.0	0.2	2 × H.W.	275	60	—	—	B7	29
50Y6	50.0	0.15	2 × H.W.	117	75	16	30	IO	53
Replacement Type									
V30	30.0	0.2	H.W.	275	120	—	50	B5	1
Current Types									
APV4	4.0*	2.0	F.W.	400–0–400	120	—	—	B4	14
AZ31	4.0	1.1	F.W.	300–0–300	100	60	—	IO	60
RV200/600	4.0*	2.8	F.W.	600–0–600	200	—	—	B4	5
RV120/500	4.0*	2.0	F.W.	500–0–500	120	—	—	B4	5
80	5.0*	2.0	F.W.	350–0–350	125	—	50	UX4	3
5U4	5.0*	3.0	F.W.	450–0–450	225	—	75	IO	60
5V4G	5.0	2.0	F.W.	375–0–375	175	—	100	IO	62
5Y3	5.0*	2.0	F.W.	350–0–350	125	—	—	IO	60
5Z4	5.0	2.0	F.W.	350–0–350	125	—	50	IO	62
GZ32	5.0	2.3	F.W.	500–0–500	125	60	150	IO	62
GZ33	5.0	2.8	F.W.	500–0–500	250	16	75	IO	62
GZ34	5.0	1.9	F.W.	550–0–550	160	60	175	IO	62
6BT4	6.3	0.6	F.W.	350–0–350	90	50	300	B8A	14
6V4	6.3	0.6	F.W.	350–0–350	90	50	300	B9A	31
6X4	6.3	0.6	F.W.	325–0–325	70	—	150	B7G	31
6X5	6.3	0.6	F.W.	325–0–325	70	4	150	IO	54
			For pulsed input PIV_{max} = 22kV.						
EZ41	6.3	0.4	F.W.	250–0–250	60	50	325	B8A	14
EZ81	6.3	1.0	F.W.	350–0–350	150	50	240	B9A	31
EZ35	6.3	0.6	F.W.	325–0–325	70	16	350	IO	54
PY31	17.0	0.3	H.W.	250	125	60	175	IO	55
			PIV = 4.5kV max. $I_{a(pk)}$ = 450mA max. $V_{hk(pk)}$ = 4.5kV max.						
19X3	19.0	0.3	PIV = 4.0kV max. $I_{a(pk)}$ = 180mA max. $V_{hk(pk)}$ = 650V max.					B9A	18

(Continued)

Type	Heater		Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Max. Reservoir Capacitance (μF)	Min. Series Resistance (Ω)	Base	
	Volts	Amps						Type	Ref.
TUNGSRAM (*Continued*)									
Current Types (Continued)									
19Y3	19.0	0.3	H.W.	250	180	60	100	B9A	18
CY1	20.0	0.2	H.W.	250	75	32	125	Ct8	5
CY31	20.0	0.2	H.W.	250	120	32	125	IO	55
V20	20.0	0.2	H.W.	250	120	32	125	B5	8
25Z4	25.0	0.3	H.W.	250	100	16	100	IO	55
25Z5 }	25.0	0.3	2 × H.W.	235	150	16	100	UX6	9
25Z6 }								IO	111
PY32	29.0	0.3	H.W.	250	275	100	56	IO	111
31A3	31.0	0.1	H.W.	250	100	50	210	B8A	1
35W4	35.0	0.15	H.W.	117	100	—	15	B7G	33
35Z4	35.0	0.15	H.W.	235	100	—	100	IO	55
35Z5	35.0	0.15	H.W.	235	100	40	100	IO	51
UY85	38.0	0.1	H.W.	250	110	100	100	B9A	18
PZ30	52.0	0.3	2 × H.W.	240	200	50	50	IO	52
AMERICAN									
Current Types									
OZ4	—	—	F.W.	300–0–300	75	—	—	IO	57
OY4	—	—	H.W.	95	75	—	—	IO	61
1B48	—	—	H.W.	350	50	—	—	—	—
1V2	0.625*	0.3	H.W.	—	0.5	—	—	B9A	5
2W3	2.5*	1.5	H.W.	350	55	—	—	IO	59
2Z2	2.5*	1.5	H.W.	350	50	—	—	UX4	4
3B25	2.5*	5.0	H.W.	PIV=4.5kV	500	—	—	UX4	9
3B27	2.5	5.0	H.W.	3,000	250	—	—	UX4	4
3B24	5.0*	3.0	H.W.	—	60	—	—	UX4	13
5AZ4	5.0*	2.0	F.W.	500	125	—	—	IO	60
5T4	5.0*	3.0	F.W.	450–0–450	225	—	150	IO	60
5V4	5.0	2.0	F.W.	375–0–375	175	—	100	IO	62
5W4	5.0*	1.5	F.W.	350–0–350	100	4	50	IO	60
5Y4	5.0*	2.0	F.W.	350–0–350	125	—	—	IO	61
6AX5	6.3	1.2	F.W.	450	40	—	—	IO	54
6W4	6.3	1.2	H.W.	—	125	—	—	IO	109
6W5	6.3	0.9	F.W.	350–0–350	100	—	—	IO	54
6Y5	6.3	0.8	F.W.	350–0–350	50	—	—	UX6	12
6Z3	6.3	0.3	H.W.	350	50	—	—	UX4	3
6Z5	6.3	0.8	F.W.	230–0–230	60	—	—	UX6	13
6ZY5	6.3	0.3	F.W.	325–0–325	40	—	25	IO	54
12Y4	12.6	0.3	F.W.	325	70	—	—	B8B	1
12Z3	12.6	0.3	H.W.	250	60	—	—	UX4	5
12Z5	12.6	0.3	H.W.	225	60	—	—	UX7	10
14Z3	12.6	0.3	H.W.	250	60	—	—	UX4	5
25W4	25.0	0.3	H.W.	350	125	—	—	IO	109
25X6	25.0	0.15	V.D.	125	60	—	—	IO	53
25Y4	25.0	0.15	H.W.	250	75	—	—	IO	55
25Z3	25.0	0.3	H.W.	250	50	—	—	UX4	5
28Z5	28.5	0.24	F.W.	325	100	—	—	B8B	1
35Y4	35.0	0.15	H.W.	235	100	—	—	IO	50
35Z6	35.0	0.3	V.D.	125	110	—	—	IO	53
40Z5	40.0	0.15	H.W.	125	100	—	—	IO	51
45Z3	45.0	0.075	H.W.	117	65	—	15	B7G	20
45Z5	45.0	0.15	H.W.	235	60	—	100	IO	51
50X6	50.0	0.15	V.D.	117	75	—	—	B8B	11
50Y7	50.0	0.15	F.W.	117	65	—	—	B8B	49
50Z6	50.0	0.3	V.D.	125	150	—	—	IO	53
50Z7	50.0	0.15	V.D.	117	65	—	15	IO	52
117Z3	117.0	0.04	H.W.	117	90	—	15	B7G	35
117Z4	117.0	0.04	H.W.	117	90	—	—	IO	55
117Z6	117.0	0.075	2 × H.W.	235	120	40	100	IO	53

METAL RECTIFIERS

Type	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Reservoir Capacitance (μF)	Rectified Volts
BRIMAR					
Replacement Types					
D3/2/1Y	H.W.	136* per arm	1.0 per arm	—	112** per arm
K3/15	H.W.	360	1.0	—	840**
K3/25	H.W.	600	1.0	—	1,400**
K3/40	H.W.	960	1.0	—	2,240**
K3/45	H.W.	1,080	1.0	—	2,520**
K3/50	H.W.	1,200	1.0	—	2,800**
K3/100	H.W.	2,400	1.0	—	5,600**
Q1/1	H.W.	68*	0.25	—	56**
Q1/2	H.W.	136*	0.25	—	112**
Q1/5	H.W.	340*	0.25	—	280*
Q3/3	H.W.	204*	1.0	—	168**
Q3/4	H.W.	272*	1.0	—	224**
Q3/5	H.W.	340*	1.0	—	280**
Q6/1	H.W.	68*	3.5	—	56**
Q6/5	H.W.	340*	3.5	—	280**
RM4B	H.W.	250	250	32	268
SB2	H.W.	125	40	32	125
SB3	H.W.	250	60	32	220
V3/1/1Y	H.W.	68* per arm	1.0 per arm	—	56** per arm
V3/2/1Y	H.W.	136* per arm	1.0 per arm	—	112** per arm
Current Types					
C2H†	H.W.	125	60	16	115
C3H†	H.W.	125	120	16	85
C2D†	H.W.	250	60	16	245
C2D†	V.D.	125	60	16	245
C3D†	H.W.	250	120	16	245
C3D†	V.D.	125	120	16	205
C2V†	F.W.	125–0–125	120	16	120
C3V†	F.W.	125–0–125	240	16	115
C3B†	Bridge	250	120	16	250
DRM1B	H.W.	250	60	16	280
DRM2B	H.W.	250	100	16	260
DRM3B	H.W.	250	120	16	285
RM0	H.W.	125	30	8	130
RM1	H.W.	125	60	16	140
RM1A	H.W.	125	100	16	150
RM2	H.W.	125	100	32	130
RM3	H.W.	125	120	16	140
RM4	H.W.	250	250	32	268
RM5	H.W.	250	300	32	255

* Peak inverse volts. ** Max. instantaneous reverse d.c. volts. † Contact-cooled types.

G.E.C.					
Replacement Types					
13H18XF	H.W.	250	500	100	250
13H21SF	H.W.	250	500	100	250
313H15XF	H.W.	250	500	100	250
96497	H.W.	250	300	100	280
	V.D.	125	300	120	270
9749730‡	H.W.	250	60	16	290
AR2	H.W.	250	300	100	290
KB4	H.W.	250	275	64	290
KB5	H.W.	250	300	100	290
MR4A	H.W.	250	300	100	290
P46H1X and intermediate types to P46H9X	H.W.	16 144	5.0 5.0	8.0 1.0	16 144
PR1	H.W.	250	275	64	290
Z11H8X	H.W.	125	80	20	130
Z11H16X	H.W.	250	80	20	290

(*Continued*)

Type	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Reservoir Capacitance (μF)	Rectified Volts
G.E.C. (*Continued*)					
Replacement Types (Continued)					
Z12H8X	H.W.	125	190	48	130
Z12H14XF	H.W.	200	350	100	200
Z12H16X	H.W.	250	190	48	290
Z13H8X	H.W.	125	375	100	130
Z13H16X	H.W.	250	375	100	290
Z21H8X	H.W.	125	125	32	130
Z21H16X	H.W.	250	125	32	290
Z22H8X	H.W.	125	275	64	130
Z22H9X	H.W.	125	300	64	130
Z22H16X	H.W.	250	275	64	290
Z46H10X and intermediate types to Z46H440X	H.W.	160	5.0	0.8	160
	H.W.	7,040	5.0	0.02	7,040
Z48H10X and intermediate types to Z48H440X	H.W.	160	12.0	2.0	160
	H.W.	7,040	12.0	0.045	7,040
ZC12H16XFE	H.W.	240	200	48	270
ZC12H17XFE	H.W.	250	200	48	280
ZC13D8XE	V.D.	120	300	64	270
ZC13D9XE	V.D.	125	300	100	280
ZC13H16XE	H.W.	240	300	64	270
ZC13H16XF	H.W.	250	500	100	250
ZC22D9X	H.W.	250	300	100	290
ZE22H16X‡	H.W.	250	275	64	290
ZE22H18X‡	H.W.	250	300	100	290

Note: Equivalents to some of the above replacement types may be found in the Index and Equivalents section.

Current Types					
46H1 and intermediate types to 46H33	H.W.	28	5	4.5	28
	H.W.	6,120	5	0.02	6,120
48H1 and intermediate types to 48H33	H.W.	28	12	10	28
	H.W.	6,120	12	0.05	6,120
RR0	H.W.	125	30	16	140
RR1	H.W.	125	60	16	130
RR2	H.W.	125	100	32	135
RR3	H.W.	125	120	32	130
SEI4	H.W.	250	275	32	275
SEI5	H.W.	250	325	32	275
SEI7	H.W.	250	300	100	290
SEI9	H.W.	250	300	100	290
SEI10	H.W.	250	280	100	290
SEI11	H.W.	250	300	100	290
SEI12	H.W.	250	300	100	290
SEI60	H.W.	250	300	100	290
SEI61	H.W.	250	300	100	290
Z11B1X	Bridge	27	150	—	21.5
Z11H9X	H.W.	125	90	20	130
Z11H17X	H.W.	250	90	20	290
Z12B1X	Bridge	27	360	—	21.5
Z12H9X	H.W.	125	225	48	130
Z12H17X	H.W.	250	225	48	290
Z13B1X	Bridge	27	720	—	21.5
Z13H9X	H.W.	125	450	100	290
Z13H17X	H.W.	250	450	100	290
Z21B1X	Bridge	27	240	—	21.5
Z21H9X	H.W.	125	150	32	130
Z21H17X	H.W.	250	125	32	290
Z22B1X	Bridge	27	520	—	21.5
Z22H17X	H.W.	250	300	64	290

(*Continued*)

Type	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Reservoir Capacitance (μF)	Rectified Volts
G.E.C. (*Continued*)					
Current Types (Continued)					
ZC12H18X	H.W.	250	325	100	290
ZC13H17XE	H.W.	250	300	100	280

‡ Printed-circuit types.

Note: Rectified voltage may be considerably reduced by any series dropping resistance in the circuit.

S.T.C.					
Obsolete Types					
DRM1B	H.W.	250	60	8	250
DRM2B	H.W.	250	100	16	250
DRM3B	H.W.	250	120	16	260
RM1	H.W.	125	60	16	130
RM2	H.W.	125	100	32	125
RM3	H.W.	125	120	16	100

Note: Equivalents to the above obsolete types will be found in the Index and Equivalents section of this book.

Current Types					
B18-14-1RW	Bridge	220	60	4	250
B25-14-1RW	Bridge	220	100	4	250
B18-1-1RW	Bridge	18	60	—	14
B25-1-1W	Bridge	18	150	—	14
B45-1-1W	Bridge	18	600	—	14
C2H	H.W.	125	60	16	115
C3H	H.W.	125	120	16	85
C2D	H.W.	250	60	16	245
C3D	H.W.	250	120	16	245
C2D	F.W.	125	60	16	245
C3D	F.W.	125	120	16	205
C2V	F.W.	125–0–125	120	16	120
C3V	F.W.	125–0–125	240	16	115
C3B	Bridge	250	120	16	250
DSM1	H.W.	250	60	8	250
DSM2/3	H.W.	250	120	16	250
RM0	H.W.	125	30	8	130
RM4	H.W.	250	250	32	268
SM1	H.W.	125	60	16	130
SM2/3	H.W.	125	120	16	100
SM5	H.W.	250	300	100	288
V18-28-1RW	F.W.	220–0–220	60	4	224
V25-28-1RW	F.W.	250–0–250	100	4	224
V25-40-1W	F.W.	350–0–350	150	4	345
V25-56-1RW	F.W.	500–0–500	100	4	535
Q3/1 and intermediate types to K3/200	H.W.	24	1	4	23
	H.W.	4,800	1	0.01	5kV
Q8/1 and intermediate types to K8/200	H.W.	24	5	16	25
	H.W.	4,800	5	0.25	5.7kV
N388/6 and intermediate types to N388/200	H.W.	108	10	16	137
	H.W.	3,600	10	0.5	4.25kV

C = Contact-cooled selenium rectifiers of small volume.

WESTINGHOUSE					
Obsolete Types					
011L999	H.W.	3.0	225	1,000	2.0
14RA 1-2-8-2†	H.W.	250	200	64	280
14RA 1-2-8-3†	H.W.	250	300	100	280
14RA 2-1-16-1†	C.T.	250–0–250	200	24	270
16K1 and intermediate types to 16K16	H.W.	15 and multiples to 240	8.0	32	15
	H.W.		8.0	2.0	240

(*Continued*)

Type	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Reservoir Capacitance (μF)	Rectified Volts
WESTINGHOUSE (*Continued*)					
Obsolete Types (Continued)					
18RA 1-1-8-1†	H.W.	125	60	32	140
18RA 1-1-8-2†	H.W.	125	120	64	140
18RA 1-1-16-1†	H.W.	250	60	16	280
18RA 1-2-8-1†	V.D.	125	60	32	270
18RA 2N-1-8-1†	C.T.	120–0–120	120	24	130
18RD 2-2-8-1†	Bridge	250	120	16	270
36K1 and intermediate types to	H.W.	27 and multiples to	2.0	4.0	30
36K14	H.W.	378	2.0	0.5	440
Current Types					
4A88	V.D.	150	200‡	2 × 32	250
4C1017	C.T.	2.5–0–2.5	120‡	2,000	1.5
4D958	C.T.	2.5–0–2.5	100	2,000	1.5
5D1	H.W.	2	40	240	1.5
14A86	H.W.	240	200‡	64	280
14A97	F.W.	240	250‡	64	275
14A100	H.W.	250	200‡	64	290
14A124	F.W.	250	200‡	80	300
14A144	F.W.	350	200‡	64	500
14A163	V.D.	120	120‡	2 × 50	250
14A342	H.W.	250	300‡	100	290
14A975	H.W.	250	120‡	16	260
14A949	H.W.	250a.c./d.c.	200	100	280
14B35	H.W.	100	70‡	32	110
14B130	H.W.	240	200‡	64	265
14B261	H.W.	210	70‡	32	240
14B980	H.W.	240	70‡	50	275
14B986	H.W.	250	70‡	16	275
15B35	H.W.	240	45‡	32	270
15B39	C.T.	95–0–95	100‡	32	95
15C997	H.W.	125	35	36	150
15D19	H.W.	125	25	32	150
2 × 15D39	C.T.	120–0–120	45‡	32	140
16HT12 and intermediate types to	H.W.	180	8	4	190
16HT258	H.W.	3,865	8	0.2	4,120
16MB1 and intermediate types to	H.W.	15	8	32	15
16MB16	H.W.	240	8	2	240
16RC1-1-16-1†	H.W.	250	20	4	280
16RD2-2-8-1†	Bridge	250	40	4	260
16RE 2-1-8-1†*	C.T.	120–0–120	40	8	130
18RD 2N-1-16-1	C.T.	250–0–250	120	16	270
36EHT10 and intermediate types to	H.W.	270	2	0.5	300
36EHT240	H.W.	6,480	2	0.05	7,900
36MB1 and intermediate types to	H.W.	30	2	4	30
36MB.13	H.W.	390	2	0.33	390
39E10 and intermediate types to	H.W.	270 and multiples to	0.1	0.25	310
39E60	H.W.	1,020	0.1	0.005	1,900
39K1 and intermediate types to	H.W.	30 and multiples to	0.1	0.2	30
39K13	H.W.	390	0.1	0.015	390
EC1†	H.W.	250	120§	32	280
EC1†	Bridge	250	120§	16	270
EC1†	C.T.	250–0–250	120§	16	270
EC2†	H.W.	250	60§	16	280
EC2†	V.D.	125	60§	16	260
EC3†	C.T.	250–0–250	180§	32	275
EC3†	H.W.	250	180§	50	280
EC3†	Bridge	250	180§	32	280
EC4†	H.W.	500	60§	8	560
EC4†	V.D.	250	60§	8	520
EC9†	H.W.	250	60§	16	280
EC10†	H.W.	150	60§	24	170

(*Continued*)

Type	Type of Rectification	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Reservoir Capacitance (μF)	Rectified Volts
WESTINGHOUSE (*Continued*)					
Current Types (Continued)					
EC11†	H.W.	500	75§	8	550
EC11†	V.D.	250	75§	8	550
EC12†	H.W.	300	60§	8	320
EC12†	V.D.	150	60§	16	320
EC13†	H.W.	400	60§	8	440
EC15†	Bridge	30	120§	120	32
EC16†	Bridge	90	120§	64	100
EC18†	Bridge	60	120§	64	65
EC19†	Bridge	120	120§	32	130
EC19†	C.T.	120–0–120	120§	32	130
FC31†	H.W.	250	300	100	280
FC101†	H.W.	250	200	64	280
FC107†	C.T.	250–0–250	200	24	270
FC116†	H.W.	250	60	16	280
FC117†	H.W.	125	120	64	140
FC118†	H.W.	125	60	32	140
HT43	V.D.	275	120	2 × 16	600
HT44	V.D.	210	120	2 × 16	400
HT45	V.D.	170	120	2 × 16	300
HT46	H.W.	250	120	16	240
HT47	H.W.	250	120	16	260
HT48	H.W.	250	45	8	260
HT49	H.W.	108	30	8	120
HT50	F.W.	300–0–300	40	8	350
HT51	F.W.	350–0–350	100	16	400
HT52	F.W.	350–0–350	200	32	400
HT53	F.W.	500–0–500	200	32	600
HT54	H.W.	120ϕ	60	16	110
HT57	H.W.	240	300	100	270
HT59	H.W.	250	300	100	280
HT60	H.W.	250	325	64	270
HT61	H.W.	250	350	64	270
HT62	H.W.	250	325	64	270
HT63	H.W.	250	325	64	270
LW7	H.W.	240	300‡	100	270
LW9	H.W.	250	300‡	100	280
LW13	H.W.	240	300	100	280
LW15	H.W.	250	200	100	280
011L992	H.W.	3	225	1,000	2.0

* The current rating given is typical for average conditions of ventilation, but the actual rating in any particular application will depend on the cooling provided and may be above or below the figure quoted.
ϕ Maximum open circuit voltage. Potential divider (line cord) a.c. or d.c.
† Contact-cooled types.
* Case forms d.c. negative connection.
§ Max. output current for chassis temperature not greater than 55°C.

SEMICONDUCTOR RECTIFIERS

(*Silicon or germanium diodes rated at over* 300PIV *or* 100mA *maximum rectified current ; but not exceeding* 10A.)

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current +1V (mA)	Application	Connections
A.E.I.								
Current Types								
GJ3M	Germanium	200	550§	—	—	—	Medium-power rectifier	Terminal studs
GJ4M	Germanium	75	800§	—	—	—		
GJ5M	Germanium	300	550§	—	—	—		
GJ6M	Germanium	150	800§	—	—	—		
MS1H	Silicon	60	250	—	50**	200	General purpose for ambient temperature up to 150°C	Wire ended
MS2H	Silicon	100	250	—	50**	200		
MS3H	Silicon	150	250	—	100**	200		
MS4H	Silicon	200	250	—	100**	200		
MS5H	Silicon	300	250	—	100**	200		

(*Continued*)

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current +1V (mA)	Application	Connections
FERRANTI (*Continued*)								
Current Types (*Continued*)								
ZS50	Silicon	60	200	—	<0.5†	—	General purpose	Wires—single ended
ZS51		120	200	—	<0.5†	—		
ZS52		200	200	—	<0.5†	—		
ZS53		300	200	—	<0.5†	—		
		* At 1.2 volts.		† At PIV.		‡ With cooling fin.		
G.E.C.								
Current Types								
GEX541	Germanium	80	6,000**	1,000	1,000	4,000††	General purpose	Cathode stud
GEX542	Germanium	160	6,000**	800	1,000	4,000††		
SX631	Silicon	100	750	1*	—	1,000	General purpose	
SX632	Silicon	250	750	3*	—	1,000		
SX633	Silicon	300	750	3*	—	1,000		
SX634	Silicon	400	750	5*	—	1,000		
SX641	Silicon	60	290	1*	—	100	Detectors, switching	Cathode lead red
SX642	Silicon	120	270	2*	—	100		
SX643	Silicon	180	260	3*	—	100		
SX644	Silicon	300	190	4*	—	100		
SX645	Silicon	400	190	5*	—	100		
SX751	Silicon	100	8,000**	200†	—	1,000	General purpose	Anode stud
SX752	Silicon	200	8,000**	200†	—	1,000		
SX753	Silicon	300	8,000**	200†	—	1,000		
SX754	Silicon	400	8,000**	200†	—	1,000		
		* At PIV at 100°C.		** With cooling fins.		† At PIV at 150°C.		†† At 0.4V.
MULLARD								
Current Types								
BYZ12	Silicon	400	6,000	—	750 (at −400V)	5,000 (at +1.5V)	Power rectifier	Wires. Threaded stud at positive end
BYZ13	Silicon	200	6,000	—	750 (at −200V)	5,000 (at +1.5V)		
OA5	Germanium	100	115*	1.1	2.5	200 (at +0.8V)	General purpose industrial	Wires. Cathode adjacent to coloured dot
OA200	Silicon	50	160	—	0.02	30 (at +0.9V)		Wires. Coloured band at positive end
OA202	Silicon	150	160	—	0.01 (at −150V)	30 (at +0.9V)		Wires. Coloured band at positive end
OA210	Silicon	400	500*	25 (at −60V)	45 (at −400V)	400	Power rectifier	Wires. Threaded stud at positive end
OA211	Silicon	800	400*	10 (at −170V)	15 (at −700V)	400		
			* With cooling fins.					
S.T.C.								
Obsolete Types								
RS20A	Silicon	50	500	—	—	—	Power rectifier	Axial lead wires. Red and black sleeves.
RS21A	Silicon	100	500	—	—	—		
RS22A	Silicon	150	500	—	—	—		
RS23A	Silicon	300	500	—	—	—		
RS24A	Silicon	300	500	—	—	—		
RS25A	Silicon	400	500	—	—	—		
RS30A	Silicon	50	1,000	—	—	—		
RS31A	Silicon	100	1,000	—	—	—		
RS32A	Silicon	150	1,000	—	—	—		
RS33A	Silicon	200	1,000	—	—	—		
RS34A	Silicon	200	1,000	—	—	—		
RS35A	Silicon	400	1,000	—	—	—		
Current Types								
RS20AF	Silicon	50	200‡	—	—	—	General purpose power rectifiers.	Axial lead wires. Red and blue sleeves.
RS21AF	Silicon	100	200‡	—	—	—		
RS22AF	Silicon	150	200‡	—	—	—		
RS23AF	Silicon	200	200‡	—	—	—		
RS24AF	Silicon	300	200‡	—	—	—		
RS25AF	Silicon	400	100‡	—	—	—		
RS26AF	Silicon	500	100‡	—	—	—		
RS27AF	Silicon	600	100‡	—	—	—		
RS28AF	Silicon	800	100‡	—	—	—		
RS30BF	Silicon	50	250	—	—	—		Stud (positive) and flexible-braid sleeved lead
RS31BF	Silicon	100	250	—	—	—		
RS32BF	Silicon	150	250	—	—	—		

(Continued)

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current +1V (mA)	Application	Connections
S.T.C. (*Continued*)								
Current Types (*Continued*)								
RS33BF	Silicon	200	250	—	—	—	General purpose power rectifiers.	Stud (positive) and flexible-braid sleeved lead.
RS34BF	Silicon	300	250	—	—	—		
RS35BF	Silicon	400	250	—	—	—		
RS36BF	Silicon	500	250	—	—	—		
RS37BF	Silicon	600	250	—	—	—		
RS38BF	Silicon	800	250	—	—	—		
RS50AF	Silicon	50	100	—	—	—		Stud (negative) and flexible-braid sleeved lead.
RS51AF	Silicon	100	100	—	—	—		
RS52AF	Silicon	150	100	—	—	—		
RS53AF	Silicon	200	100	—	—	—		
RS54AF	Silicon	300	100	—	—	—		
RS54AF	Silicon	400	100	—	—	—		
RS55AF	Silicon	500	100	—	—	—		
					‡ At 100°C.			
TEXAS								
Current Types								
1S001 (CV7027)	Diffused silicon. Metal case.	200	750	—	<10 (at −200V)	—	Magnetic amplifiers, power supplies, high temperature operation.	Axial wires. Arrow indicates forward current flow.
1S002		300	750	—	<10 (at −300V)	—		
1S003 (CV7028)		400	750	—	<10 (at −400V)	—		
1S004		500	750	—	<10 (at −500V)	—		
1S005		600	750	—	<10 (at −600V)	—		
1S101		200	750	—	<10 (at −200V)	—		
1S103		400	750	—	<10 (at −400V)	—		
1S105		600	750	—	<10 (at −600V)	—		
1S107		800	750	—	<10 (at −800V)	—		
1S111 (CV7045)	Diffused silicon. Glass seal.	200	400	—	<0.2 (at −200V)	—	As above, modulators, demodulators, medium-speed pulse circuits.	Axial wires. Colour code at cathode.
1S113 (CV7013)		400	400	—	<0.2 (at −400V)	—		
1S115 (CV7046)		600	400	—	<0.2 (at −600V)	—		
1S401	Diffused silicon. Metal case.	200	3,000	—	<10 (at −200V)	—	Power supplies, medium power high temperature operation.	Anode to tag, cathode to stud. Addition of " R "to type number indicates anode to stud.
1S402		300	3,000	—	<10 (at −300V)	—		
1S403		400	3,000	—	<10 (at −400V)	—		
1S404		500	3,000	—	<10 (at −500V)	—		
1S405		600	3,000	—	<10 (at −600V)	—		
1S600	p-n-p-n diffused silicon controlled rectifiers. Metal case stud mounting.	50	3,000	—	<1,000 (at −50V)	—	High-speed power switching at high temperature.	Anode to stud, cathode to large tag. Gate to small tag.
1S601		100	3,000	—	<1,000 (at −100V)	—		
1S602		200	3,000	—	<1,000 (at −200V)	—		
1S603		300	3,000	—	<1,000 (at −300V)	—		
1S604		400	3,000	—	<1,000 (at −400V)	—		
1S610	p-n-p-n diffused silicon controlled rectifiers. Metal case.	50	1,000	—	<1,000 (at −50V)	—		Reading clockwise from tab : cathode, gate, anode (case).
1S611		100	1,000	—	<1,000 (at −100V)	—		
1S612		200	1,000	—	<1,000 (at −200V)	—		
1S613		300	1,000	—	<1,000 (at −300V)	—		
1S614		400	1,000	—	<1,000 (at −400V)	—		

(Continued)

Type	Nature	Peak Inverse Volts	Max. Rect. Current (mA)	Reverse Current (μA) −10V	Reverse Current (μA) −50V	Forward Current +1V (mA)	Application	Connections
TEXAS *(Continued)*								
Current Types (Continued)								
1N1130	Diffused silicon. Metal case, stud mounting.	1,500	300	—	<50 (at −1,500V)	—	High voltage power rectification.	Cathode to stud.
1N1131		1,500	300	—	<50 (at −1,500V)	—		Anode to stud.

E.H.T. RECTIFIERS

(Rectifiers for inputs over 1,000V *giving rectified currents of less than* 50mA)

Type	Heater Volts	Heater Amps	Peak Inverse Volts	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Effective Series R (Ω)	Recommended Reservoir Capacitance (μF)	D.C. Output Voltage	Capacitance a-k (pF)	Base Type	Base Ref.
BRIMAR											
Obsolete Types											
R10	4.0	0.5	12,500	3,500	5.0	62,000	0.25	—	—	B7G	22
R11	4.0	1.1	—	5,000	5.0	4,000	1.0	—	—	B4	6
Replacement Types											
R19/1X2B	1.25	0.2	25,000	—	2.0	—	—	—	1.0	B9A	32
R16/1T2	1.4	0.14	15,000	—	2.0	—	—	—	0.65	Wires	
R12	6.3	0.09	17,000	—	0.1	10,000	0.1	—	—	Wires	
Current Types											
DY86	1.4	0.55	22,000	—	0.8	—	0.002	—	1.7	B9A	50
R20	2.0	0.35	22,000	—	0.8	—	0.002	—	1.7	B9A	50
EY86	6.3	0.09	22,000	—	0.8	—	0.002	—	1.7	B9A	50
COSSOR											
Obsolete Types											
405BU	4.0*	0.5	—	1,500-0-1,500	25	2,000	4.0	—	—	B4	5
6W2	6.3	0.08	25,000	—	0.5	—	0.005	—	0.7	Wires	
Replacement Types											
SU25	2.0	0.5	25,000	—	1.0	—	0.1	—	—	IO	102
SU2150	2.0	1.15	—	8,000	2.0	100,000	0.25	—	—	B4	6
SU2150A	2.0	1.5	—	5,000	10.0	10,000	0.25	—	—	B4	17
Current Types											
SU42	4.0	1.25	—	6,000	40.0	5,000	1.0	—	—	IO	103
				5,000	50.0	4,000	1.0	—			
EY51 (SU61)	6.3	0.09	15,000	—	0.1	100,000	0.001	—	—	Wires	
			15,000	—	0.5	100,000	0.1	—			
EY86	6.3	0.09	22,000	—	0.8	—	0.002	—	1.7	B9A	50
EDISWAN MAZDA											
Obsolete Types											
MU2 (HW, MV)	2.0*	3.1	—	4,500	5.0	10,000	—	—	—	B4	6
U21	2.0	1.85	—	4,500	5.0	—	—	—	—	B4	6
Replacement Types											
U22	2.0	2.0	—	5,200	1.0	50,000	0.1	—	—	MO	17
U24	2.0	0.15	20,000	—	0.1	—	0.00025	15,000	1.3	IO	102
Sine-wave operation			20,000	—	0.5	—	to 0.001	9,500	1.3		
U25	2.0	0.2	19,000	—	0.2	—	0.00025	16,000	0.6	Wires	
Sine-wave operation			19,000†	—	0.5	—	to 0.001	9,500	0.6		
Current Types											
U26	2.0	0.35	23,500	—	0.2	—	0.00025 to 0.001	—	0.9	B9A	50
19H4	2.5	1.7	—	7,000	30.0	18,000	0.5	—	—	IO	58
19G3	4.0	1.4	—	2,200	50.0	1,900	5.0	—	—	IO	119
19G6	4.0	0.5	—	2,500	30.0	5,400	1.0	—	—	B7G	22
S19G6 (SQ)	4.0	0.5	—	2,000	30.0	4,500	1.1	—	—	B7G	78
S19G6F (SQ)	4.6	0.5	—	2,000	30.0	4,500	1.1	—	—	B7G	78
				† at <250 kc/s.							
EMITRON											
Obsolete Types											
SU45	4.0	0.5	—	2,500	30.0	5,400	1.1	—	—	B7G	22
6W2	6.3	0.08	25,000	—	0.5	—	0.005	—	0.7	Wires	
					30.0	100,000	0.1	—			
Replacement Type											
SU25	2.0	0.5	25,000	—	1.0	100,000	0.1	—	—	IO	102
Current Type											
SU2150A	2.0	1.5	—	5,000	10.0	10,000	0.25	—	—	B4	17

(Continued)

Type	Heater Volts	Heater Amps	Peak Inverse Volts	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Effective Series R (Ω)	Recommended Reservoir Capacitance (μF)	D.C. Output Voltage	Capacitance a-k (pF)	Base Type	Base Ref.
FERRANTI											
Replacement Types											
HR1	0.65*	0.055	12,500	5,000	0.05	2MΩ	0.002	—	0.7	B7G	1
6W2	6.3	0.08	25,000	—	0.5	—	0.005	—	0.7	Wires	
Current Types											
HR2	4.0	0.5	13,000	5,000	5.0	50,000	0.25	5,500	—	B7G	22
HR3	4.0	0.5	11,500	5,000	15.0	30,000	1.0	—	—	B7G	22
HR8	4.0	1.25	16,500	6,000	40.0	5,000	1.0	—	—	IO	103
				5,000	50.0	4,000	1.0	—	—		
HR9	4.0	1.3	14,000	15,000	8.0	100,000	0.1	—	—	IO	131
HR11	4.0*	1.9	35,000	14,500	3.0	—	—	—	—	IO	120
HR12	2.5*	5.0	35,000	—	25	27,000	0.1	—	—	UX4	18
EY51/6X2	6.3	0.09	17,000	—	0.35	—	0.005	—	0.8	Wires	
Sine-wave operation (10-500 kc/s)			17,000	—	0.5	—	0.01	—	—		
EY86/6S2	6.3	0.09	22,000	—	0.8	—	0.002	—	1.7	B9A	50
G.E.C.											
Obsolete Types											
U41	1.25	9.2	—	12,300	2.0	300,000	—	—	—	IO	58
U17	4.0*	1.0	—	2,500	30.0	2,000	1.0	—	—	B4	6
U27	4.0	1.0	—	5,000	50.0	4,000	—	—	—	B4	6
U60	6.3	0.265	—	10,600	4.0	—	—	—	—	IO	139
Replacement Types											
U37	1.4	0.14	15,000	—	2.0	—	0.001	7,500	0.45	Wires	
U45	6.3	0.12	18,000	—	0.35	100,000	0.005	—	0.8	Wires	
U16	2.0*	1.0	—	5,000	2.0	—	0.25	—	—	B4	6
U33	2.0*	1.0	—	6,300	3.0	100,000	0.25	—	—	B4	6
CV4071	4.0	1.5	—	6,000	50.0	—	—	—	—	IO	103
EY51/U43	6.3	0.09	17,000	—	0.35	100,000	0.005	—	0.8	Wires	
EY86	6.3	0.09	22,000	—	0.8	—	0.002	—	1.7	B9A	50
Current Types											
U47	2.0	0.2	20,000	—	0.2	—	0.00025	15,000	—	Wires	
U49	2.0	0.35	25,000	—	0.2	—	0.00005 to 0.001	—	—	B9A	50
MARCONI											
Obsolete Types											
U151	6.3	0.09	17,000	—	0.35	—	0.005	—	0.8	Wires	
Sine-wave operation			17,000	—	0.5	—	0.01	—	0.8		
Replacement Types											
U35	1.4	0.12	—	3,500	2.0	—	0.001	—	—	IO	120
U16	2.0*	1.0	—	5,000	2.0	—	0.25	—	—	B4	6
U33	2.0*	0.15	—	6,300	3.0	100,000	0.25	—	—	B4	6
U17	4.0*	1.0	—	2,500	30	2,000	1.0	—	—	B4	6
Current Types											
U37	1.4	0.14	15,000	—	2.0	—	0.001	7,500	0.65	Wires	
EY51/U43	6.3	0.09	17,000	—	0.35	100,000	0.005	—	0.8	Wires	
Sine-wave operation			17,000	—	0.5	—	0.01	—	0.8	Wires	
EY86	6.3	0.09	22,000	—	0.8	—	0.002	—	6.7	B9A	50
U45	6.3	0.12	18,000	—	0.35	100,000	0.005	—	0.8	Wires	
MULLARD											
Obsolete Types											
DY70	1.25*	0.14	—	2,900	1.8	150,000	0.1	—	—	Wires	
HVR1	2.0	0.29	—	6,000	5.0	—	—	—	—	B4	6
HVR2A	2.0	1.5	—	6,000	3.0	—	0.2	—	—	B4	6
HVR2	4.0	0.65	—	6,000	3.0	—	0.2	—	—	B4	17
Current Types											
EY51 Pulsed input	6.3	0.09	17,000	—	0.35	—	0.005	—	0.08	Wires	
Sine-wave operation (10-500 kc/s)			17,000	—	0.5	—	0.001	—	0.8		
EY86 Pulsed input	6.3	0.09	22,000	—	0.8	—	0.002	—	1.7	B9A	50
TY86F Pulsed input	7.4	0.077	Other data as EY86								
S.T.C.											
Current Types											
K8/80	—	—	6,400	—	0.1	—	0.005	5,600	—	(metal rectifier)	
K8/100	—	—	8,000	—	0.1	—	0.005	7,200	—	(metal rectifier)	
K8/120	—	—	9,600	—	0.1	—	0.005	8,600	—	(metal rectifier)	
K8/140	—	—	11,200	—	0.1	—	0.005	10,000	—	(metal rectifier)	
K8/180	—	—	14,400	—	0.1	—	0.005	12,900	—	(metal rectifier)	
K8/200	—	—	16,000	—	0.1	—	0.005	14,400	—	(metal rectifier)	
2T/270K	4.0	0.5	15,500	—	5.0	50,000	0.3	5,500	—	B7G	22

(Continued)

E.H.T. Rectifiers

Type	Heater Volts	Heater Amps	Peak Inverse Volts	Input Volts (R.M.S.)	Max. Rect. Current (mA)	Min. Effective Series R (Ω)	Recommended Reservoir Capacitance (μF)	D.C. Output Voltage	Capacitance a-k (pF)	Base Type	Base Ref.
TUNGSRAM											
Current Types											
6X2	6.3	0.09	17,000	—	0.35	—	0.005	—	0.8	Wires	
Sine-wave operation (10-500 kc/s)			17,000	—	0.5	—	0.01	—	0.8	Wires	
EY86	6.3	0.09	22,000	—	0.8	—	0.002	—	1.7	B9A	50
WESTINGHOUSE											
Current Types											
39E10 Sine-wave operation and intermediate types to			850	—	0.1	—	0.025	310	—	Metal rectifiers	
39E60 Sine-wave operation			5,100	—	0.1	—	0.005	1,900	—		
36EHT20 Sine-wave operation and intermediate types to			1,700	—	2.0	—	0.5	600	—		
36EHT240 Sine-wave operation			20,400	—	2.0	—	0.05	7,900	—		
39E20 and intermediate types to			1,450	—	0.1	—	—	1,310	—		
39E60			4,350	—	0.1	—	—	3,430	—		
36EHT20 and intermediate types to			1,450	—	0.1	—	—	1,310	—		
36EHT240			17,400	—	0.1	—	—	15,700	—		
AMERICAN											
Current Types											
1B3	1.25	0.2	40,000	—	2.0	—	—	—	—	IO	58
2B25	1.4	0.11	—	1,000	1.5	—	—	—	—	B7G	12
1Z2	1.5	0.3	—	7,800	2.0	—	—	—	—	B7G	10
2V3	2.5	5.0	16,500	—	2.0	—	—	—	—	IO	58
2X2	2.5	1.75	—	4,500	5.0	—	—	—	—	UX4	8
2Y2	2.5	1.75	—	4,400	5.0	—	—	—	—	UX4	8
3B26	2.5	4.75	15,000	—	26.0	—	—	—	—	IO	58
5X3	5.0	2.0	—	1,275–0–1,275	30.0	—	—	—	—	UX4	3
6Y3	6.3	0.7	—	5,000	7.5	—	—	—	—	IO	102

CATHODE-RAY TUNING INDICATORS

Type	Heater Volts	Heater Amps	Target Volts	Target Current (mA)	Grid Voltage Change	Base Type	Base Ref.
BRIMAR							
Obsolete Types							
6U5G	6.3	0.3	250	4.0	22	IO	46
EM71	6.3	0.3	250	2.5	20	B8B	57
12U5	12.6	0.15	Other data as type 6U5G				
1629	12.6	0.15	250	4.0	8	IO	46
Replacement Types							
6U5/6G5	6.3	0.3	250	4.0	22	UX6	11
EM85	6.3	0.3	250	2.1	18	B9A	40
Current Types							
EM84	6.3	0.25	250	1.1 to 1.6	22	B9A	56
EM840	6.3	0.25	250	1.1 to 1.6	21	B9A	56
COSSOR							
Obsolete Types							
63ME	6.3	0.3	250	4.5	22	IO	46
65ME	6.3	0.3	250	2 to 2.3	15	B9A	41
Current Types							
64ME (Dual sensitivity)	6.3	0.2	250	0.75	2.5 & 16	IO	48
EM81	6.3	0.3	250	2 to 2.3	9.5	B9A	41
EDISWAN MAZDA							
Obsolete Types							
AC/ME	4.0	0.5	250	1.5	22	B7	19
ME41	4.0	0.5	250	1.16	22.5	MO	21
ME91	9.0	0.2	175	2.7	19	MO	21
ME920	9.0	0.2	175	2.6	19	B7	19
10M1	18.0	0.1	250	1.16	22.5	IO	46
Replacement Types							
6M1	6.3	0.3	250	1.16	22.5	IO	46
6M2 (Dual sensitivity)	6.3	0.2	250	0.46	4 & 20	IO	135
10M2 (Dual sensitivity)	12.6	0.1	200	0.4	3 & 20	IO	136
Current Type							
1M1	1.4	0.025	90 / 60	0.25 / 0.12	13.5 / 8.0	B8D	9

(Continued)

Type	Heater Volts	Heater Amps	Target Volts	Target Current (mA)	Grid Voltage Change	Base Type	Base Ref.
FERRANTI							
Obsolete Types							
FT4	4.0	0.5	200–250	0.5	6	IO	46
VFT4	4.0	0.5	200–250	0.5	20	IO	46
Replacement Types							
VFT6	6.3	0.3	200	4.5	22	IO	46
1629	12.6	0.15	250	2.0	7.5	IO	46
Current Types							
DM70/1M3	1.4*	0.025	85 / 60	0.17 / 0.1	10 / 7	B8D	9
EM80/6BR5	6.3	0.3	250	2.3	13	B9A	41
EM81	6.3	0.3	250	2.3	9.5	B9A	41
G.E.C.							
Obsolete Types							
Y25	1.4	0.25	90 / 60	0.25 / 0.12	13.5 / 8	B8D	9
Y62	6.3	0.3	80–250	4.5	22	IO	46
Y63	6.3	0.3	180–250	4.5	22	IO	46
Y64	6.3	0.3	80–250	4.5	22	IO	46
Y65	6.3	0.3	180–250	4.5	11	IO	46
Y119	19	0.1	90–250	1.0	1.3	B9A	41
Replacement Type							
Y61	6.3	0.3	180–250	4.5	22	IO	46
MARCONI							
Current Types							
EM80	6.3	0.3	250	2.0	13	B9A	41
EM81	6.3	0.3	250	2 to 2.3	9.5	B9A	41
MULLARD							
Obsolete Types							
TV4	4.0	0.3	250	0.13	5	Ct8	9
EM1	6.3	0.2	250	0.13	5	Ct8	9
EM3	6.3	0.2	250	0.3	21	Ct8	9
EM4 (Dual sensitivity)	6.3	0.2	250	0.75	5 & 16	Ct8	20
UM34 (Dual sensitivity)	12.6	0.1	250	0.75	5 & 16	IO	48
Replacement Types							
DM70	1.4*	0.025	85 / 60	0.17 / 0.1	10 / 7	B8D	9
EM34 (Dual sensitivity)	6.3	0.2	250	0.75	5 & 16	IO	48
EM80	6.3	0.3	250	2.3	13	B9A	41
EM81	6.3	0.3	250	2.3	9.5	B9A	41
UM4	12.6	0.1	200	1.4	4.2 & 12.5	IO	136
Current Types							
EM84 (Dual sensitivity)	6.3	0.27	250	1.6	22.0	B9A	56
UM80	19.0	0.1	200	7.0	13.0	B9A	41
TUNGSRAM							
Obsolete Types							
VME4	4.0	0.5	250	2.0	22	B7	19
6G5G	6.3	0.3	250	2.0	22	IO	46
EFM1	6.3	0.2	250	0.75	20	Ct8	18
EM1 (Dual sensitivity)	6.3	0.2	250	0.7	5	Ct8	9
EM4 (Dual sensitivity)	6.3	0.2	250	0.75	5 & 16	Ct8	20
ME6-S	6.3	0.2	250	2.0	5	Ct8	9
Replacement Type							
EM34	6.3	0.2	250	0.75	5 & 16	IO	48
Current Types							
DM70	1.4*	0.025	85 / 60	0.17 / 0.10	10 / 7	B8D	9
6FG6	6.3	0.27	250	1.6	22	B9A	55
6U5G	6.3	0.3	250	0.4	22	IO	46
EM80	6.3	0.3	250	2.3	13	B9A	41
EM81	6.3	0.3	250	2.3	9.5	B9A	41

(Continued)

Cathode-Ray Tuning Indicators

Type	Heater Volts	Heater Amps	Target Volts	Target Current (mA)	Grid Voltage Change	Base Type	Base Ref.
AMERICAN							
Current Types							
2E5	2.5	0.8	250	4.0	7.5	UX6	11
2G5	2.5	0.8	250	4.0	22	UX6	11
6AB5 } 6N5 }	6.3	0.15	135	1.9	15.5	UX6	11
6AD6 (Dual sensitivity)	6.3	0.15	150	3.0 & 1.2	3.0 & 5.0	IO	46
6AF6	6.3	0.15	135	1.5	81	IO	100
6AF7	6.3	0.3	—	—	—	IO	48
6AL7	6.3	0.15	300	—	—	IO	101
6E5	6.3	0.3	250	2.0	7.5	UX6	11
6G5 } 6H5 } 6U5 }	6.3	0.3	250	4.0	22	UX6	11
6T5	6.3	0.3	250	4.0	—	UX6	11
6X6	6.3	0.3	250	2.0	—	IO	46
1629	12.6	0.15	250	2.0	7.5	IO	46

BARRETTERS

Type	Stabilized Current (A)	Voltage Drop	Base Type	Base Ref.
BRIMAR				
Current Type				
D15	0.15	90–140	IO	75
EDISWAN MAZDA				
Obsolete Types				
BU10	0.13	50–80	B4	13
BU29/4	0.285	2.5–6	IO Pins 2 & 7	
BU30/6	0.3	3–9	Edison Screw	
BU65/10	0.65	6–14	Edison Screw	
BU78/10	0.78	8–14	B4	20
BU115/22	1.15	11–31	B4	20
BU200/14	2.0	8–20	B4	20
BU280/20	2.8	10–30	B4	13
BU600/6	6.0	3–9	Edison Screw	
G.E.C.				
Obsolete Type				
101	0.1	75–150	IO	75
Replacement Types				
161	0.16	100–180	Edison Screw	
301	0.3	138–221	Edison Screw	

Type	Stabilized Current (A)	Voltage Drop	Base Type	Base Ref.
G.E.C. (*Continued*)				
Replacement Types (Continued)				
302	0.3	112–195	Edison Screw	
303	0.3	86–129	,,	,,
304	0.3	95–165	,,	,,
305	0.3	40–90	,,	,,
HIVAC				
Current Types				
XB1	0.3	9–16	B7G	57
XB2	0.305	7.4–12.4	B7G	57
TUNGSRAM				
Obsolete Types				
BR201 } BR201S }	0.2	90–230	B4 / Ct8	13 / 8
BR202 } BR202S }	0.2	40–100	B4 / Ct8	13 / 8
BR300OC	3.0	7–18	Edison Screw	
BR300	0.3	90–230	B4	13
BR1500	1.5	—	,,	,,

VALVE VOLTAGE STABILIZERS

Type	Mean Stab. Volts	Striking Volts	Tube Current (mA) Min.	Tube Current (mA) Max.	Regulation (volts)	Base Type	Base Ref.
BRIMAR							
Current Types							
OC2	75	115	5	30	4.5	B7G	28
VR75/30	75	100	5	40	6.5	IO	74
VR105/30	105	135	5	40	4.0	IO	74
OB2	108	133	5	30	4.0	B7G	28
OA2	150	185	5	30	6.0	B7G	28
VR150/30	150	180	5	40	5.5	IO	74
6BK4	E.h.t. Voltage Regulator					IO	130
$V_h = 6.3$. $I_h = 0.2$A. V_a max. = 25kV. I_a max. = 1.5mA.							
COSSOR							
Replacement Types							
85A2	85	115	1	10	3	B7G	28
S130	120	180	6	75	5	B4	12
S130P	120	135§	5	75	7.5	B4	15
150C4	150	165	5	30	6	B7G	28
150B3	153	170	2	20	5	B7G	40

(*Continued*)

Type	Mean Stab. Volts	Striking Volts	Tube Current (mA) Min.	Tube Current (mA) Max.	Regulation (volts)	Base Type	Base Ref.
EMITRON							
Replacement Types							
S130	120	180	6	75	5	B4	12
S130P	120	135§	5	75	7.5	B4	15
ENGLISH ELECTRIC							
Obsolete Types							
QS83/3	83	115	1	8	1.5	B7G	28
QS1204	108	133	5	25	3.0	B7G	28
Current Types							
OA2(QS1207)	150	185	5	30	6.0	B7G	28
OA2WA(QS1210) (SQ)	150	165	5	30	5.0	B7G	28
OA3(QS1205)	75	105	5	40	6.5	IO	74
OB2(QS1208)	108	133	5	30	3.5	B7G	28
OB2WA(QS1211) (SQ)	108	133	5	30	3.0	B7G	28
OC2	75	115	5	30	4.5	B7G	28
OC3(QS1206)	108	133	5	40	4.0	IO	74
OD3(QS150/40)	150	180	5	40	5.5	IO	74
QS75/20	75	110	2	20	6.0	B7G	70
QS75/60	75	117	5	60	5.0	B8B	64
QS92/10	92	140	1	10	5.0	B4	12
QS95/10	95	110	2	10	5.0	B7G	40
QS108/45	108	120	5	45	5.0	B8B	55
QS150/15	150	170	2	15	5.0	B7G	40
QS150/45	150	170	5	45	5.0	B8B	55
QS1200	150	180	5	15	5.0	B7G	55
QS1201 (SQ)	75	110	2	15	4.5	B7G*	28
QS1202 (SQ)	108	133	2	15	3.0	B7G*	28
QS1203 (SQ)	150	180	2	15	4.5	B7G*	28
QS1209/5651	85	115	1	10	4.0	B7G	28
QS1212 (SQ)	85	115	1	10	4.0	B7G	28
QS1213 (SQ)	85	115	1	10	4.0	B7G*	28
QS1215	90	115	1	40	10	B7G	28
STV280/40*	280	420	5	35	4**	B5	15
STV280/80*	280	420	10	70	4**	B5	15

* Flying leads. ** Per gap.

Type	Mean Stab. Volts	Striking Volts	Tube Current (mA) Min.	Tube Current (mA) Max.	Regulation (volts)	Base Type	Base Ref.
FERRANTI							
Current Types							
KD21	75	105	5.0	40	4.5	IO	74
KD24	105	135	5.0	40	4.0	IO	74
KD25	150	180	5.0	40	5.5	IO	74
KD60	62	80	0.1	2.5	0.4	Caps	
KD61	62	80	0.1	2.5	0.4	Wires	
KD63	62	100	0.2	2.5	0.5	Wires	
G.E.C.							
Obsolete Types							
QS105/45	105	130†	5	45	5	B8B	55
S130	120	160	6	75	5	B4	12
S130P	120	135§	5	75	7.5	B4	15
ST11	100	140	1	8	5	B4	12
Replacement Types							
QS70/20	70	95	2	20	6	B7G	53
QS75/40	75	105	5	40	6.5	IO	74
QS83/3	83	130	1	5	—	B7G	52
QS95/10	95	110	2	10	5	B7G	40
QS108/45	108	120†	5	45	5	B8B	55
QS150/15	150	177	2	15	5	B7G	40
QS150/40	150	180	5	40	5.5	IO	74
QS150/45	150	170††	5	45	5	B8B	55
STV280/40*	280	420	5	35	—	B5	15
STV280/80*	280	420	10	70	—	B5	15

(*Continued*)

Valve Voltage Stabilizers

Type	Mean Stab. Volts	Striking Volts	Tube Current (mA) Min.	Tube Current (mA) Max.	Regulation (volts)	Base Type	Base Ref.
MULLARD							
Replacement Types							
75B1	75	110	2	22	6	B7G	40
85A1§§	85	125	1	8	—	B8B	41
95A1	95	110	2	10	5	B7G	40
4687	100	130	10	40	6	Ct8	22
4687A	100	130	10	40	6	B4	12
7475	100	140	1	8	2	B4	12
13201A	100	135	15	200	5	B4	12
150C2	150	185	5	30	6	B7G	28
150B3	153	170	2	20	5	B7G	40
Current Types							
75C1 / M8225 (SQ)	78	115	2	60	<5	B7G	55
83A1§§	83	130	3.5	6.0	<1.1	B7G	55
85A2§§ / M8098§§ (SQ) / M8142§§ (SQ)	85	115	1	10	3	B7G	28
M8190§§ (SQ) (85A3)	86	125	0.5	3.5	3	Wires	
90C1 / M8206 (SQ)	90	115	1	40	14	B7G	28
5644	90	125	5	25	5	B8D	12
108C1 / M8224 (SQ)	108	133	5	30	3.5	B7G	28
150C4 / M8223 (SQ)	150	165	5	30	6	B7G	28
150B2 / M8163 (SQ) / M8208 (SQ)	150	180	5	15	5	B7G	55
S.T.C.							
Replacement Type							
G120/1B	55	120	2	30	4.7	B4	12
Current Types							
G50/2G	50	90	0.3	3.0	3.5	Wires	
G55/1K	55	90	2	30	5	B7G	28
G75/3G	75	115	5	60	6.5	B8B	58
OC2	175	115	5	30	4.5	B7G	28
VR75/30	75	105	5	40	6.5	IO	74
OB2	108	127	5	30	3.5	B7G	28
VR105/30	108	127	5	40	4	IO	74
G300/1K	130+150	400	5	15	6	B7G	75
G180/2G	150	180	5	45	5	B8B	59
G180/2M	150	180	5	45	5	B8B	59
OA2	150	180	5	30	6	B7G	28
VR150/30	150	180	5	40	5.5	IO	74
G400/1K	306	400	2	4	3	B7G	62
G400/2G	306	400	2	4	3	B7G	62
TUNGSRAM							
Current Types							
VR105/30	105	135	5.0	40	4.0	IO	74
VR150/30	150	180	5.0	40	5.5	IO	74
AMERICAN							
Current Types							
OA3	75	105	5	40	—	IO	74
1B47	82	225	1	2	—	B7G	28
1C21	—	180	—	0.1	—	IO	108
0B3	90	125	5	40	—	IO	74
0C3	105	135	5	40	2	IO	74
0B2	108	133	5	30	—	B7G	28
0A2	150	155	5	30	—	B7G	28
0D3	150	185	5	40	4	IO	74

§ With primer taken to 190V through 50kΩ.
† With primer taken to 150V through 40kΩ.
†† With primer taken to 200V through 80kΩ.
††† With primer taken to 200V through 100kΩ.
‡ With primer taken to 150V through 250kΩ.
‡‡ With primer taken to 150V through 100kΩ.
‡‡‡ With primer taken to 240V through 250kΩ.

* Multi-gap types.
§§ Voltage reference tubes.

ZENER DIODES

Type	Nominal Zener Voltage (V)	Zener Current (mA) Max.	Zener Current (mA) Average	Max. Dissipation (W)	Reverse Current mμA at −V		Dynamic Slope Resistance (Ω)	Connections
A.E.I.								
Current Types								
VR35-A	3.5	1,260‡	—	5.5	—	—	20	Stud mounted.
VR35-B	3.5	520	—	2.25	—	—	20	Wire ended.
VR425-A	4.25	1,150‡	—	5.5	—	—	19	Stud mounted.
VR425-B	4.25	470	—	2.25	—	—	19	Wire ended.
VR475A	4.75	1,050‡	—	5.5	—	—	18	Stud mounted.
VR475B	4.75	430	—	2.25	—	—	18	Wire ended.
VR525A-A	5.25	970‡	—	5.5	—	—	17	Stud mounted.
VR525A-B	5.25	400	—	2.25	—	—	17	Wire ended.
VR525B-A	5.25	970‡	—	5.5	—	—	12	Stud mounted.
VR525B-B	5.25	400	—	2.25	—	—	12	Wire ended.
VR575A-A	5.75	900‡	—	5.5	—	—	10	Stud mounted.
VR575A-B	5.75	370	—	2.25	—	—	10	Wire ended.
VR575B-A	5.75	900‡	—	5.5	—	—	5	Stud mounted.
VR575B-B	5.75	370	—	2.25	—	—	5	Wire ended.
VR625-A	6.25	840‡	—	5.5	—	—	4	Stud mounted.
VR625-B	6.25	350	—	2.25	—	—	4	Wire ended.
VR7-A	7.0	690‡	—	5.5	—	—	4	Stud mounted.
VR7-B	7.0	280	—	2.25	—	—	4	Wire ended.
VR8-A	8.0	570‡	—	5.5	—	—	4	Stud mounted.
VR8-B	8.0	240	—	2.25	—	—	4	Wire ended.
VR9-A	9.0	520‡	—	5.5	—	—	4	Stud mounted.
VR9-B	9.0	220	—	2.25	—	—	4	Wire ended.
VR10-A	10.0	490‡	—	5.5	—	—	5	Stud mounted.
VR10-B	10.0	200	—	2.25	—	—	5	Wire ended.
VR11-A	11.0	440‡	—	5.5	—	—	8	Stud mounted.
VR11-B	11.0	180	—	2.25	—	—	8	Wire ended.
VR12-A	12.0	400‡	—	5.5	—	—	12	Stud mounted.
VR12-B	12.0	160	—	2.25	—	—	12	Wire ended.

‡ When mounted on a copper cooling fin 0.032in. thick by 1.75in. square.
NOTE :—Current for dynamic slope resistance is 20mA.

FERRANTI								
Current Types								
KS30A	3·3	110	—	0.15	1,000	0.5	110	Wires. Single-ended.
KS30B	3.3	110	—	0.15	1,000	0.5	110	
KS31A	3.6	110	—	0.15	1,000	0.5	85	
KS32A	3.9	90	—	0.15	1,000	1.0	70	
KS32B	3,9	90	—	0.15	1,000	1.0	70	
KS33A	4.3	80	—	0.15	1,000	1.0	65	
KS34A	4.7	75	—	0.15	1,000	1.0	60	
KS34B	4.7	75	—	0.15	1,000	1.0	60	
KS35A	5.1	65	—	0.15	1,000	1.0	55	
KS36A	5.6	60	—	0.15	1,000	1.0	35	
KS36B	5.6	60	—	0.15	1,000	1.0	50	
KS37A	6.2	50	—	0.15	1,000	1.0	8	
KS38A	6.8	45	—	0.15	100	3.0	8	
KS38B	6.8	45	—	0.15	100	3.0	8	
KS39A	7.5	42	—	0.15	100	3.0	6	
KS40A	8·2	40	—	0.15	100	3.0	6	
KS40B	8.2	40	—	0.15	100	3.0	6	
KS41A	9.1	35	—	0.15	100	3.0	8	
KS42A	10.0	30	—	0.15	100	3.0	15	
KS42B	10.0	30	—	0.15	100	3.0	15	
KS43A	11.0	27	—	0.15	100	3.0	20	
KS44A	12.0	25	—	0.15	100	3.0	25	
KS44B	12.0	25	—	0.15	100	3.0	25	

NOTE :—Current for dynamic slope resistance and Zener voltage is 5mA.

G.E.C.								
Current Types								
SX47	4.7	—	—	0.3	200	2	80	Cathode lead red
SX51	5.1	—	—	0.3	100	2	70	
SX56	5.6	—	—	0.3	100	2	40	
SX62	6.2	—	—	0.3	50	2	30	

(Continued)

Type	Nominal Zener Voltage (V)	Zener Current (mA) Max.	Zener Current (mA) Average	Max. Dissipation (W)	Reverse Current mμA at −V		Dynamic Slope Resistance ohms	Connections
G.E.C. *(Continued)*								
Current Types (Continued)								
SX68	6.8	—	—	0.3	20	2	20	Cathode lead red.
SX75	7.5	—	—	0.3	10	2	20	
SX82	8.2	—	—	0.3	5	2	30	
SZT1	5.6	—	—	0.3	150	2	80	
SZT2	5.6	—	—	0.3	100	2	55	
MULLARD								
Current Types								
BZZ10	6.0	50	25	0.21	30	2.0	—	Wires. Coloured band at positive end.
BZZ11	6.5	50	25	0.21	40	3.0	—	
BZZ12	7.2	50	25	0.21	30	3.0	—	
BZZ13	7.9	50	25	0.21	20	3.0	—	
OAZ200	4.7	100	50	0.26	250	2.0	—	Wires. Positive lead adjacent to coloured dot.
OAZ201	5.1	100	50	0.26	100	2.0	—	
OAZ202	5.7	100	50	0.26	30	2.0	—	
OAZ203	6.2	100	50	0.26	40	3.0	—	
OAZ204	6.8	100	50	0.26	30	3.0	—	
OAZ205	7.5	100	50	0.26	20	3.0	—	
OAZ206	8.2	100	50	0.26	40	5.0	—	
OAZ207	9.1	100	50	0.26	30	5.0	—	
OAZ208	4.2	100	50	0.26	200	1.5	—	
OAZ209	5.2	100	50	0.26	100	2.0	—	
OAZ210	6.3	100	50	0.26	10	2.0	—	
OAZ211	7.6	100	50	0.26	20	3.0	—	
OAZ212	9.2	100	50	0.26	30	5.0	—	
OAZ213	12.2	100	50	0.26	25	5.0	—	
S.T.C.								
Current Types								
Z2A33F§‡	3.3	—	—	1.0	—	—	19.5	Axial wire leads. Red and green sleeves, voltage tolerance ±5%.
Z2A36F§‡	3.6	—	—	1.0	—	—	17.5	
Z2A39F§‡	3.9	—	—	1.0	—	—	15.5	
Z2A43F§‡	4.3	—	—	1.0	—	—	13.5	
Z2A47F§‡	4.7	—	—	1.0	—	—	11.5	
Z2A51F§‡	5.1	—	—	1.0	—	—	9	
Z2A56F§‡	5.6	—	—	1.0	—	—	7	
Z2A62F§‡	6.2	—	—	1.0	—	—	4.5	
Z2A68F§‡	6.8	—	—	1.0	—	—	3	
Z2A75F§‡	7.5	—	—	1.0	—	—	2.8	
Z2A82F§‡	8.2	—	—	1.0	—	—	3.5	
Z2A91F§‡	9.1	—	—	1.0	—	—	5	
Z2A100F§‡	10	—	—	1.0	—	—	7	
Z2A110F§‡	11	—	—	—	—	—	9.5	
Z2A120F§‡	12	—	—	1.0	—	—	12.5	
Z2A130F§‡	13.2	—	—	1.0	—	—	15.5	
Z2A150F§‡	14.5	—	—	1.0	—	—	23	
TEXAS								
Current Types								
1S5015	15	530	—	8 at stud temp. 50°C	15,000	5.0	5.0	Metal can, stud mounting. Anode to stud, cathode to tag. Addition of "C" to type number denotes cathode to stud, anode to tag. Addition of "R" denotes a symmetrical reversible unit.
1S5016	16	500	—		10,000	5.0	5.0	
1S5018	18	450	—		10,000	5.0	5.0	
1S5020	20	400	—		10,000	5.0	5.0	
1S5022	22	360	—		10,000	10	5.0	
1S5024	24	330	—		10,000	10	5.0	
1S5027	27	300	—		10,000	10	5.0	
1S5030	30	270	—		10,000	10	5.0	
1S5033	33	240	—		10,000	10	5.0	
1S5036	36	220	—		10,000	10	5.0	
1S5039	39	200	—		10,000	10	7.0	
1S5043	43	180	—		10,000	10	7.0	
1S5047	47	170	—		10,000	10	7.0	

Note :—Current for dynamic slope resistance is 5mA.

§ Made with 20% voltage tolerance when terminations are axial wire leads with red and blue sleeves.
‡ Made with 10% voltage tolerance when terminations are axial wire leads with red and yellow sleeves.

Note :—Current for dynamic slope resistance is 20mA.

(Continued)

Type	Nominal Zener Voltage (V)	Zener Current (mA) Max.	Zener Current (mA) Average	Max. Dissipation (W)	Reverse Current mμA at −V		Dynamic Slope Resistance ohms	Connections
TEXAS *(Continued)*								
Current Types (Continued)								
1S5051	51	160	—	8 at stud temp. 50°C	10,000	10	10	Metal can, stud mounting. Anode to stud, cathode to tag. Addition of "C" to type number denotes cathode to stud. anode to tag. Addition of "R" denotes a symmetrical reversible unit.
1S5056	56	140	—		10,000	10	10	
1S5062	62	130	—		10,000	10	10	
1S5068	68	120	—		10,000	10	15	
1S5075	75	110	—		10,000	10	15	
1S5082	82	100	—		10,000	10	15	
1S5091	91	88	—		10,000	10	20	
1S5100	100	80	—		10,000	10	20	
1S5110	110	73	—		10,000	10	20	
1S5120	120	66	—		10,000	10	25	
1S5130	130	62	—		10,000	10	25	
1S5150	150	53	—		10,000	10	25	
1S7033	3.3	120	—	0.4 at 25°C	300,000	2	20	Colour code at cathode end
1S7036	3.6	110	—		200,000	2	20	
1S7039	3.9	100	—		100,000		18	
1S7043	4.3	90	—		60,000	2	15	
1S7047A (CV7099)	4.7	85	—		50,000	2	13	
1S7051A (CV7100)	5.1	75	—		30,000	2	10	
1S7056A (CV7101)	5.6	70	—		20,000	2	5	
1S7062A (CV7102)	6.2	65	—		5,000	2	2	
1S7068A (CV7103)	6.8	60	—		1,000	2	1	
1S7075A (CV7104)	7.5	55	—		1,000	2	1	
1S7082A (CV7105)	8.2	50	—		1,000	2	1	
1S7091	9.1	45	—		1,000	2	2	
1S7100	10.0	40	—		1,000	2	3	
1S7110	11.0	36	—		1,000	2	5	
1S7120	12.0	33	—		1,000	2	8	
1S7130	13.0	31	—		1,000	2	12	
1S7150A (CV7106)	15.0	27	—		1,000	2	20	

Note :—Current for dynamic slope resistance is 20mA.

THYRATRONS

Type	Heater Volts	Heater Amps	Max. Anode Volts	Max. Peak Current (mA)	Control Ratio	Valve Voltage Drop	Max. Frequency (c/s)*	Base Type	Base Ref.
BRIMAR									
Current Type									
2D21	6.3	0.6	650	500	250	8	—	B7G	15
COSSOR									
Replacement Types									
GD14B	4.0	1.75	350	500	45	15–18	50,000	B5	9
GDT4C	4.0	1.75	350	1,000	40	15–18	10,000	B5	9
EDISWAN MAZDA									
Obsolete Type									
T31	4.0	1.5	400	500	20	40	20,000	B5	9
Replacement Types									
T41	4.0	1.5	400	500	20	40	20,000	MO	16
6K25	6.3	0.95	400	500	20	40	20,000	IO	20
Current Types									
20A2	6.3	1.0	650	1,250	300	9	—	IO	118
20A3	6.3	0.6	650	500	250	8	—	B7G	46
21A1	6.3	0.95	600	1,250	300	9	—	IO	126

(Continued)

Type	Heater Volts	Heater Amps	Max. Anode Volts	Max. Peak Current (mA)	Control Ratio	Valve Voltage Drop	Max. Frequency (c/s)*	Base Type	Base Ref.
ENGLISH ELECTRIC									
Current Types									
AFX203	2.5*	5.0	170	7,700	—	11	—	UX4	24
3D22A	6.3	2.6	650	8,000	—	10	—	UX7	16
6D4	6.3	0.25	350	110	—	18	—	B7G	24
AFX234	6.3	0.49	350	1,200	—	16	—	B7G	24
FERRANTI									
Replacement Type									
GK3	Cold cathode		140	20	—	73	—	B4	18
Current Types									
EN30	Cold cathode		380	250A	—	20	—	IO	124
GK10	Cold cathode		150	30	—	70	—	B7G	56
GK20	Cold cathode		230	30	—	130	—	B7G	56
GK32	Cold cathode		140	20	—	80	—	Caps	
GK33	Cold cathode		140	20	—	80	—	Wires	
GK40	Cold cathode		150	20	—	73	—	Caps	
GK41	Cold cathode		150	20	—	73	—	Wires	
GN10	Cold cathode		550	250A	—	20	—	IO	123
GN20	Cold cathode		420	250A	—	20	—	IO	123
3C23	2.5	7.0	1,250	6,000	—	16	—	UX4	20
GL1	2.5	7.0	1,250	6,000	—	16	—	IO	125
GL2	2.5	3.2	1,250	2,500	—	16	—	IO	132
G.E.C.									
Current Types									
GT1C	4.0	1.35	500	1,000	—	—	8,000	B5	1
GT3	6.3	0.85	500	300	—	—	—	IO	115
HIVAC									
Replacement Type									
XC13	Cold cathode		200	7.5	—	70	—	Wires	
Current Types									
XFG1	1.25	0.05	45	—	—	—	—	Wires	
XG2	6.3	0.150	500	100	200	10	200	B8D	10
XC18	Cold cathode		200	1.0	—	73	—	Wires	
XC23	Cold cathode		200	7.5	—	67.5	—	Wires	
XC24	Twin-trigger version of XC18								
XG3	Twin-grid version of XG2								
MULLARD									
Obsolete Types									
Z800U	Cold cathode		275	10	—	110	—	B9A	58
Z801U	Cold cathode		170	10	—	105	—	B9A	57
Replacement Types									
AN1	4.0	1.45	650	2,000	28	9	—	B5	1
EN31	6.3	1.3	1,000	750	35	33	150,000	IO	112
EN70	6.3	0.15	500	100	—	11	—	B8D	10
EN93	6.3	0.25	350	110	—	18	—	B7G	72
Current Types									
EN32	6.3	0.95	650	2,000	275	10	—	IO	126
EN91	6.3	0.6	650	500	250	8	500	B7G	51
EN92	6.3	0.15	350	100	—	10	—	B7G	46
Z300T/1267	Cold cathode		225	100	—	70	—	IO	108
Z700U	Cold cathode		310	16	—	116	—	Wires	
Z700W	Cold cathode		310	16	—	116	—	Wires	
Z701U	Cold cathode		165	12	—	62	—	B8D	—
Z803U	Cold cathode		290	50	—	105	—	B9A	51
Z900T	Cold cathode		200	100	—	62	—	B7G	71
Z804U	Cold cathode		400	125	—	112	—	B9A	59
S.T.C.									
Replacement Types									
4313C	Cold cathode		150	30	—	75	—	UX4	22
G1/236G	Cold cathode		235	1.5	—	70	—	Wires	

(Continued)

Type	Heater Volts	Heater Amps	Max. Anode Volts	Max. Peak Current (mA)	Control Ratio	Valve Voltage Drop	Max. Frequency (c/s)*	Base Type	Base Ref.
S.T.C. (*Continued*)									
Current Types									
2D21	6.3	0.6	650	500	250	8	—	B7G	51
3D22	6.3	2.6	650	8,000	150	10	—	B7G	73
G150/2D	Cold cathode		150	50	—	60	—	IO	141
G240/2D	Cold cathode		240	50	—	90	—	IO	141
G1/237G	Cold cathode		200	1.5	—	70	—	Wires	
G1/371K	Cold cathode		360	15	—	180	—	B7G	—
AMERICAN									
2B4	2.5	1.4	300	300	—	19	—	UX5	1
629	2.5	2.6	350	200	—	—	—	UX5	1
885	2.5	1.4	300	300	—	—	—	UX5	1
5696	6.3	0.15	500	100	250	10	—	B7G	46
6Q5	6.3	0.6	300	300	—	19	—	IO	20
884	6.3	0.6	300	300	—	—	—	IO	20

* For time-base use as a saw-tooth oscillator.

TELEVISION CATHODE-RAY TUBES

Type	Heater Volts	Heater Amps	kV (max.) Final Anode	kV (max.) First Anode	Final Anode Max. μA*	Grid Volts (cut-off)	Defl. Angle (deg.)	Volts h-k (max.)	Capacitances (pF to earth) g	Capacitances (pF to earth) k	Screen Diam. (in)	Remarks† IT, A, F, M, R, E	Base Type	Base Ref.
BRIMAR														
Obsolete Types														
C9A	2.0	1.4	6	—	150	−30	—	—	5	5	9	—	MO	24
C9B	2.0	2.5	8	—	150	−40 to −100	—	150	9	7	9	A	IO	112
C12A	2.0	1.4	6	—	150	−35	—	—	5	5	12	—	MO	24
C12D	2.0	2.5	7	—	150	−40 to −100	—	150	9	7	12	F	IO	112
C15B	2.0	2.5	14	—	150	−60 to −140	—	—	9	7	15	A	IO	112
C12E	6.3	0.6	8	—	150	−50	—	100	10	7	12	—	IO	112
Replacement Types														
C12B	2.0	2.5	12	—	150	−60 to −140	—	150	9	7	12	A, F	IO	112
C12FM	6.3	0.3	9	0.35	175	−40	63	150	7	5	12	IT, M	B12A	1
C14BM	6.3	0.6	14	—	250	−50 to −100	70	150	9	7	14††	A, M, R	B12A	5
C14PM	6.3	0.3	18	0.5	250	−33 to −77	70	180	9	6	14††	IT, E, A, M, R	B12A	11
C17BM	6.3	0.6	17.5	—	250	−50 to −100	70	150	9	7	17††	A, M, R	B12A	5
C17JM	6.3	0.6	17.5	0.41	250	−33 to −77	70	150	9	6	17††	A, M, E, R, IT	B12A	11
C17LM	6.3	0.3	18	0.5	250	−33 to −77	70	180	7	5	17††	E, A, M, R	B12A	11
C17PM	6.3	0.3	18	0.5	250	−33 to −77	70	180	9	6	17††	E, IT, A, M, R	B12A	11
C21NM	6.3	0.3	18	0.5	250	−53 to −105	70	180	7	7	21††	A, M, R, IT	B12A	10
C21HM	6.3	0.6	18	0.5	250	−33 to −77	70	180	9	6	21††	A, M, R, IT	B12A	9
C21SM	6.3	0.3	18	0.5	250	−33 to −77	90	180	7	5	21††	E, A, M, R	B12A	11
C21TM	12.6	0.3	20	0.5	250	−30 to −72	90	180	8.5	6.5	21††	IT, A, M, R	B12A	9
C14FM	12.6	0.3	14	0.41	250	−33 to −77	70	150	6	5	14††	A, M, R, IT	B12A	9
C17FM	12.6	0.3	17.5	0.41	250	−33 to −77	70	150	6	5	17††	A, M, R, IT	B12A	9
Current Types														
C17AF	4.0	0.3	17.6	0.75	250	−38 to −78	110	180	5	4	17††	A, M, R, E	B8H	2
C21AF	4.0	0.3	17.6	0.75	250	−38 to −78	110	180	5	4	21††	A, M, R, E	B8H	2
C23AG	4.0	0.3	17.6	0.75	250	−38 to −78	110	180	5	4	23††	A, M, R, E	B8H	2
C14LM	6.3	0.3	18	0.5	250	−33 to −77	70	180	7	5	14††	A, M, R, E	B12A	11
C17AA	6.3	0.3	17.6	0.5	250	−30 to −72	110	180	6	4	17††	IT, A, M, R, E	B8H	2
C17SM	6.3	0.3	18	0.5	250	−33 to −77	90	180	9	6	17††	E, A, M, R	B12A	11
C24KM	6.3	0.6	18	0.5	250	−33 to −77	70	180	9	6	24††	IT, A, M, R	B12A	9
CATHODEON														
Current Types														
C12/1	6.3	0.3	10	0.41	350	−44 to −99	50	150	6	4	12	IT, M	B12A	**1**
C14/3	6.3	0.3	14	0.45	500	−40 to −80	70	150	8	6	14	IT, E, M, R	B12A	**2**
C17/1	6.3	0.3	16	0.41	350	−44 to −99	70	150	6	4	17	M, R, IT	B12A	**1**
C17/1A	**6.3**	**0.3**	**16**	**0.41**	350	−44 to −99	70	150	**6**	**4**	**17**	A, M, R, IT	B12A	**1**

(Continued)

Type	Heater		kV (max.)		Final Anode Max. μA*	Grid Volts (cut-off)	Defl. Angle (deg.)	Volts h-k (max.)	Capacitances (pF to earth)		Screen Diam. (in)	Remarks† IT, A, F, M, R, E	Base	
	Volts	Amps	Final Anode	First Anode					g	k			Type	Ref.
CATHODEON (*Continued*)														
Current Types (Continued)														
C17/4A	6.3	0.3	16	0.41	350	−44 to −99	90	150	6	4	17	A, M, R, IT	B12A	1
C17/5A	6.3	0.3	16	0.45	500	−40 to −80	90	150	8	6	17††	IT, A, E, M, R	B12A	2
C17/7A	6.3	0.3	16	0.45	850	−30 to −72	110	150	8	6	17††	A, E, M, R	B8H	1
C19/7A	6.3	0.3	16	0.5	850	−30 to −72	110	150	8	6	19††	A, E, M, R	B8H	1
C21/1A	6.3	0.3	18	0.41	350	−44 to −99	90	150	6	4	21	A, M, R, IT	B12A	1
C21/7A	6.3	0.3	18	0.5	850	−30 to −72	110	150	8	6	21††	A, E, M, R	B8H	1
C23/7A	6.3	0.3	18	0.5	850	−30 to −72	110	150	8	6	23††	A, E, M, R	B8H	1
C27/1A	6.3	0.3	20	0.41	350	−44 to −99	90	150	6	4	27	A, M, R, IT	B12A	1
C27/5A	6.3	0.6	18	0.45	500	−40 to −80	90	150	8	6	27††	IT, A, E, M, R	B12A	2
C36/24	6.3	0.3	14	0.41	350	−44 to −99	70	150	6	4	14	M, R, IT	B12A	1
C14/13A	10.0	0.18	10	0.18	500	−30 to −50	70	150	8	6	14††	IT, A, E, M, R	B12A	2
COSSOR														
Obsolete Types														
65K/2	4.0	1.1	7	—	100	−50 max.	39	50	8.0	—	15	IT	B4E	1
75K	6.3	0.55	7	—	100	−80 max.	48	200	6.0	—	10	IT	B4E	1
85K	6.3	0.55	10	—	100	−50 max.	48	200	9.0	—	15	IT	B4E	1
108K	6.3	0.55	9	—	100	−50 max.	48	200	9.0	—	10	IT	B4E	1
121K	6.3	0.3	9	—	100	−50 max.	52	150	10.0	5	12	IT	B12A	1
141K	6.3	0.3	14	—	150	−40	70	150	6.5	5.5	14†	IT, R	B12A	1
171K	6.3	0.3	14	—	150	−40	70	150	6.5	5.5	17††	IT, R	B12A	1
172K	6.3	0.3	16	—	150	−60	70	150	8.0	6	17††	IT, R	B12A	10
Replacement Types														
MW31-74	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	12	IT, M	B12A	1
MW36-44	6.3	0.3	14	0.41‡	100	−33 to −72	65	200	7	5	14††	IT, M, R	B12A	10
Current Types														
AW43-80	6.3	0.3	16	0.5	100	−40 to −80	85	200	7	4	17††	IT, A, M, R, E	B12A	17
AW43-88	6.3	0.3	16	0.65	—	−38 to −94	110	200	6	4	17††	A, M, R, E	B8H	1
AW53-88	6.3	0.3	16	0.65	—	−38 to −94	110	200	7	5	21††	A, M, R, E	B8H	1
MW43-69	6.3	0.3	16	0.41‡	150	−40 to −86	65	100	8	6	17††	IT, A, M, R	B12A	10
MW53-80	6.3	0.3	18	0.5‡	—	−40 to −80	85	200	7	5	21††	IT, A, M, R	B12A	10
EDISWAN MAZDA														
Obsolete Types														
CRM71	2.0	1.3	4.0	—	100	−35	—	—	5	5	7	—	MO	24
CRM91	2.0	1.3	6.0	—	100	−54	64	—	5	5	9	—	MO	24
CRM92	2.0	1.3	7	—	100	−56	57	—	5.2	5.4	9	—	MO	24
CRM92A	2.0	1.3	7	—	100	−56	57	—	5.2	5.4	9	—	MO	24
CRM121	2.0	1.3	7	—	100	−56	57	—	5.2	5.4	12	—	MO	24
CRM121A	2.0	1.3	7.5	—	100	−60	57	—	5.2	5.4	12	—	MO	24
CRM121B	2.0	1.3	10	—	100	−79	57	—	5.2	5.4	12	—	MO	24
CRM123	2.0	1.3	10	—	100	−79	57	—	5.2	5.4	12	A	MO	24
CRM152A	2.0	1.3	13.0	—	100	−101	67	—	5.2	5.4	15	A	B12A	5
CRM122	7.3	0.3	7.5	—	100	−60	57	200	5.2	5.4	12	—	MO	24
Replacement Types														
CRM151	2.0	1.3	13	—	100	−101	51	—	5.2	5.4	15	A	MO	24
CRM152B	2.0	1.3	13	—	100	−101	67	—	5.2	5.4	15	A	B12A	5
CRM153	12.6	0.3	15	0.4	100	−51	67	—	8.5	6.5	15	IT, A, M	B12A	1
CRM141	12.6	0.3	14	0.4	100	−51	67	180	8.5	6.5	13.5	IT, A	B12A	1
CRM142	12.6	0.3	14	0.4	100	−51	67	180	8.5	6.5	13.5	IT, A	B12A	1
CRM143	12.6	0.3	14	0.4	100	−51	70	180	8.5	6.5	14††	IT, A, R	B12A	1
CRM171	12.6	0.3	16	0.4	100	−51	70	180	8.5	6.5	17††	IT, A, R	B12A	1
CRM211	12.6	0.3	18	0.4	100	−51	70	180	8.5	6.5	21††	IT, A, M, R	B12A	1
Current Types														
CME1706	6.3	0.3	16§	0.4	100	−51	110	180	7	4.5	17††	A, M, R, E	B8H	1
CME2103	6.3	0.3	16§	0.4	100	−51	110	180	7	4.5	21††	A, M, R, E	B8H	1
CME141	12.6	0.3	14§	0.4	100	−51	70	180	8.5	6.5	14††	IT, A, M, R, E	B12A	2
CME1402	12.6	0.3	14§	0.4	100	−51	90	180	7.5	6.5	14††	IT, A, M, R, E	B12A	2
CME1702	12.6	0.3	16§	0.4	100	−51	90	180	9.0	6.5	17††	A, M, R, E	B12A	2
CME1703	12.6	0.3	16§	0.4	100	−51	110	180	6	4.5	17††	A, M, R, E	B8H	1
CME1705	12.6	0.3	16	0.5	100	−51	110	180	8	4.5	17††	A, M, R, E	B8H	2
CME1901	12.6	0.3	17§	0.5	100	−55	114	180	6.5	4.5	19††	A, M, R, E	B8H	1
CME2101	12.6	0.3	16§	0.4	100	−51	110	180	6	4.5	21††	A, M, R, E	B8H	1
CME2104	12.6	0.3	18	0.5	100	−51	110	180	8	4.5	21††	A, M, R, E	B8H	2
CME2301	12.6	0.3	17§	0.5	100	−55	110	180	6.5	4.5	23††	A, M, R, E	B8H	1
CRM93	12.6	0.3	9	0.4	100	−51	57	180	8.5	6.5	9	IT, A	B12A	1

(Continued)

Type	Heater		kV (max.)		Final Anode Max. μA*	Grid Volts (cut-off)	Defl. Angle (deg.)	Volts h-k (max.)	Capacitances (pF to earth)		Screen Diam. (in)	Remarks† IT, A, F, M, R, E	Base	
	Volts	Amps	Final Anode	First Anode					g	k			Type	Ref.
EDISWAN MADZA (*Continued*)														
Current Types (Continued)														
CRM124	12.6	0.3	10	0.4	100	−51	57	180	8.5	6.5	12	IT, A, M	B12A	1
CRM144	12.6	0.3	14	0.4	100	−51	70	180	8.5	6.5	14††	IT, A, M, R	B12A	1
CRM172	12.6	0.3	16	0.4	100	−51	70	180	8.5	6.5	17††	IT, A, M, R	B12A	1
CRM173	12.6	0.3	16	0.4	100	−51	90	180	7.5	6.5	17††	IT, A, M, R	B12A	1
CRM212	12.6	0.3	20	0.4	100	−51	90	180	8.5	6.5	21††	IT, A, M, R	B12A	1

§ Maximum third anode voltage ±700V.

EMISCOPE														
Obsolete Types														
3/3	4.0	1.3	3.5	—	—	−32	—	—	9	7.5	9	—	Special	
3/4	4.0	1.3	4.0	—	—	−32	—	—	9	7.5	10	A	,,	
3/5	4.0	1.3	4.0	—	—	−34	—	—	9	7.5	14	—	,,	
3/6A	4.0	1.3	4.0	—	—	−34	—	—	9	7.5	15	A	,,	
6/7	4.0	1.3	7.0	1.1	—	−25	—	—	10	7.5	12	—	,,	
4/13	8.0	0.3	15.0	0.4	300	−40	70	200	15	6.0	21	A	B7B	1
5/2	8.0	0.3	17.0	0.6	—	−33 to −77	70	200	15	6.0	14	A, R	B7B	3
5/3	8.0	0.3	17.0	0.6	—	−33 to −77	70	200	15	6.0	17	A, R	B7B	3
3/16	8.5	0.3	7.0	—	—	−34	—	—	10	6.0	10	A	B7B	2
3/18	8.5	0.3	7	—	300	−34	50	200	10	6.0	12	A	B7B	2
3/31	8.5	0.3	9.0	—	150	−20	50	200	10	6.0	12	A	B7B	2
4/14T	8.5	0.3	17.0	0.4	400	−50	70	200	15	6.0	14	A, R	B7B	1
4/15T	8.5	0.3	17.0	0.4	400	−50	70	200	15	6.0	17	A, R	B7B	1
3/20	11.5	0.3	5.5	—	—	−35	—	—	10	6.0	10	—	B4E	1
Replacement Types														
3/1	4.0	1.3	2.7	—	—	−25	—	—	10	7.5	5	—	Special	
3/2	4.0	1.3	2.7	—	—	−30	—	—	9	7.5	7	—	,,	
6/5	4.0	1.3	5.0	0.9	—	−20	—	—	9	—	9	—	,,	
6/6	4.0	1.3	5.0	0.9	—	−20	—	—	9	—	12	—	,,	
Current Types														
TA10	4.0	1.0	7.0	0.25	—	−34	—	—	12	6.0	10	A	B7B	1
TA15	4.0	1.0	7.0	0.25	—	−34	—	—	12	6.0	15	A	B7B	1
SE14/70	6.3	0.3	18.0	0.5	250	−90	70	180	9	6.0	14††	IT, A, M, R, E	B12A	11
SE17/70	6.3	0.3	18.0	0.5	250	−90	70	180	9	6.0	17††	IT, A, M, R, E	B12A	11
3/32	8.0	0.3	9	—	—	−20	—	—	10	6.0	15	A	B7B	2
4/14TG	8.0	0.3	17.0	0.4	400	−50	70	200	15	6.0	14	A, R, M	B7B	1
4/15TG	8.0	0.3	17.0	0.4	400	−50	70	200	15	6.0	17	A, R, M	B7B	1
5/2T	8.5	0.3	17.0	0.6	—	−60	70	200	15	6.0	14	A, R, M, E	B7B	3
5/3T	8.5	0.3	17.0	0.6	—	−60	70	200	15	6.0	17	A, R, M, E	B7B	3
EMITRON														
Obsolete Types														
12XP4	6.3	0.3	9	0.41	150	−60	60	150	6	5	12	IT, M	B12A	9
14KP4A	6.3	0.3	14	0.41	150	−60	70	150	6.5	5.5	14††	IT, M, R	B12A	9
17ASP4	6.3	0.3	14	0.41	150	−60	70	150	6.5	5.5	17††	IT, M, R	B12A	9
85K	6.3	0.55	10	—	100	−50	52	50	9	9	15	IT	B4E	1
108K	6.3	0.55	9	—	100	−50	50	200	9	9	10	IT	B4E	1
Replacement Type														
15EP4	6.3	0.3	10	0.41	150	−60	52	150	6.5	5.5	15	IT, M	B12A	9
Current Types														
12XP4A	6.4	0.3	9	0.41	50	−60	60	200	6	5	12	IT, M	B12A	9
14LP4	6.3	0.3	14	0.41	150	−60	70	200	6.5	5.5	14††	IT, M, R	B12A	9
17AXP4	6.3	0.3	14	0.41	150	−60	70	200	6.5	5.5	17††	IT, M, R	B12A	9
ENGLISH ELECTRIC														
Obsolete Types														
T900	6.3	0.6	14	0.41	—	−33 to −77	53	125	6.5	5	16	IT	B12A	4
T901A	6.3	0.3	14	0.41	—	−33 to −77	70	200	6	5	16	IT	B12A	4
T908	6.3	0.3	16	0.41	—	−33 to −77	70	200	6	5	17††	IT, M, R	B12A	1
T909A	6.3	0.3	16	0.41	—	−33 to −77	70	200	9	15	21	IT	B12A	4
T914	6.3	0.3	16	0.41	—	−33 to −77	70	200	6	5	17††	IT, M, R	B12A	9
T915	6.3	0.3	16	0.41	—	−33 to −77	70	200	9	15	21	IT	B12A	4
FERRANTI														
Obsolete Types														
T9/2	4.0	1.0	6	—	200	−50	48	50	10	10	9	—	IO	112
T12/2	4.0	1.0	7	—	200	−55	48	50	10	10	12	—	IO	112

(Continued)

Type	Heater		kV (max.)		Final Anode Max. μA*	Grid Volts (cut-off)	Defl. Angle (deg.)	Volts h-k (max.)	Capacitances (pF to earth)		Screen Diam. (in)	Remarks† IT, A, F, M, R, E	Base	
	Volts	Amps	Final Anode	First Anode					g	k			Type	Ref.
FERRANTI (*Continued*)														
Obsolete Types (Continued)														
T12/3	4.0	1.0	7	—	200	−50	48	50	10	10	12	—	IO	112
T12/54	4.0	0.95	8	—	200	−50	50	100	10	10	12	F, M	IO	112
T12/404	4.0	0.95	9	—	200	−55	50	100	5	6	12	A, F	IO	112
T12/449	4.0	0.95	9	—	200	−55	50	100	5	6	12	F	IO	112
T12/504	4.0	0.95	9	—	200	−55	50	100	5	6	12	A, F, M	IO	112
TR14/1	4.0	0.95	12	—	150	−55	65	100	8	7	14††	A, F	IO	112
TR14/2	4.0	0.95	12	—	150	−50	65	100	8	7	14††	A, F, M, R	IO	112
TR17/1	4.0	0.95	15	—	150	−70	65	100	5	6.3	17††	A, R, F	IO	112
TR17/2	4.0	0.95	15	—	150	−70	65	100	5	6.3	17††	A, M, R, F	IO	112
TR14/4	6.3	0.3	14	—	150	−50	65	150	5	6	14††	A, F, M, R	IO	112
T12/46	6.3	0.6	8	—	200	−50	48	100	10	10	12	F	IO	112
T12/56	6.3	0.6	8	—	200	−50	48	100	10	10	12	F, M	IO	112
T12/71U	8.0	0.3	10	—	200	−60	50	200	10	10	12	F	IO	112
T12/81U	8.0	0.3	10	—	200	−60	50	200	10	10	12	A, F	IO	112
T12/82U	8.0	0.3	10	—	200	−60	50	200	10	10	12	A, F, M	IO	112
Replacement Types														
T12/91	2.0	1.5	9	—	200	−70	50	100	5	6.2	12	F	IO	112
T12/92	2.0	1.5	9	—	200	−70	50	100	5	6.2	12	F, M	IO	112
T9/3	4.0	1.0	7	—	200	−60	48	50	10	10	9	—	IO	112
T9/5	4.0	1.0	7	—	200	−60	48	50	10	10	9	M	IO	112
T12/44	4.0	0.95	8	—	200	−50	50	100	10	10	12	F	IO	112
T12/549	4.0	0.95	9	—	200	−55	50	100	5	6	12	F, M	IO	112
MW31-74	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	12	IT, M	B12A	1
MW36-24	6.3	0.3	14	0.41	100	−33 to −72	65	200	6	4	14††	IT, M, R	B12A	1
T12/100	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	12	IT, M	B12A	1
T12/72U	6.3	0.3	10	—	200	−60	50	200	10	10	12	F, M	IO	112
TR14/8	6.3	0.3	14	—	150	−50	65	200	5	6	14††	A, F, M, R	B12A	1
TR14/13	6.3	0.3	15	0.25	200	−50	65	200	4	7	14††	A, F, M, R	B12A	9
TR14/15	6.3	0.3	15	0.25	200	−50	65	200	4	7	14††	A, F, M, R	B12A	9
TR14/21	6.3	0.3	15	0.25	100	−50	65	200	<8	<6	14††	IT, M, R	B12A	1
TR14/22	6.3	0.3	15	0.25	100	−50	65	200	<8	<6	14††	A, IT, M, R	B12A	1
TR17/8	6.3	0.3	16	0.25	200	−50	65	150	4	7	17††	A, F, M, R	B12A	9
TR17/10	6.3	0.3	16	0.25	200	−50	65	150	4	7	17††	A, F, M, R	B12A	9
Current Types														
MW43-64	6.3	0.3	14	0.41	100	−43 to −77	65	200	<8	<6	17††	IT, R, M	B12A	10
TR17/21	6.3	0.3	16	0.25	100	−40 to −86	65	200	8	6	17††	IT, M, R	B12A	1
TR17/22	6.3	0.3	16	0.25	100	−40 to −86	65	200	8	6	17††	A, IT, M, R	B12A	1
TR21/21	6.3	0.3	18	0.42	100	−60	85	200	8	6	21††	IT, M, R	B12A	1
TR21/22	6.3	0.3	18	0.42	100	−60	85	200	8	6	21††	IT, M, R	B12A	1
G.E.C.														
Obsolete Types														
6501	6.3	0.5	6	—	200	−42	50	150	15	10	9	F	IO	112
6502	6.3	0.5	7	—	200	−49	50	150	15	10	9	F, M	IO	112
6504	6.3	0.5	7	—	200	−49	50	150	15	10	9	F, M	IO	112
6504A	6.3	0.5	7	—	100	−49	50	150	15	10	9	A, F, M	IO	112
6703A	6.3	0.5	8	—	100	−56	50	150	15	10	12	A, M	IO	112
6705A	6.3	0.5	10	—	100	−49	50	150	15	10	12	A, F, M	IO	112
6801A	6.3	0.5	8	—	100	−49	50	150	15	10	14	A	IO	112
6503	10.5	0.3	7	—	200	−49	50	150	15	10	9	F, M	IO	112
6505	10.5	0.3	7	—	200	−49	50	150	15	10	9	F, M	IO	112
6505A	10.8	0.3	7	—	100	−49	50	150	15	10	9	A, F, M	IO	112
6704A	10.8	0.3	8	—	100	−56	50	150	15	10	12	A, M	IO	112
6706A	10.8	0.3	10	—	100	−49	50	150	15	10	12	A, F, M	IO	112
7406A	12.6	0.3	16§	0.5	100	−51	110	180	8	4.5	17††	A, M, R, E	B8H	2
Replacement Types														
6506A	6.3	0.3	7	—	150	−49	55	150	15	10	9	F, M, A	IO	112
6802A	6.3	0.3	8	—	200	−53	55	150	15	10	14	A	IO	112
6901A	6.3	0.3	14	—	100	−70	70	150	8	8	16	A, F	B12A	5
7101A	6.3	0.3	8	—	150	−48	50	200	8	8	12	A, M	IO	112
7102A	6.3	0.3	10	—	100	−48	55	150	15	10	12	A, F, M	IO	112
7201A	6.3	0.3	14	—	150	−70	70	150	8	8	14††	A, F, R	B12A	5
7203A	6.3	0.3	14	—	250	−70	70	200	8	8	14††	A, F, M, R	B12A	5
7401A	6.3	0.3	16	—	250	−80	70	200	8	8	17††	A, F, M, R	B12A	5
Current Types														
7204A	12.6	0.3	14	0.4	100	−51	65	180	8.5	6.5	14††	IT, A, M, R	B12A	4
7404A	12.6	0.3	16	0.4	100	−51	65	180	8.5	6.5	16††	IT, A, M, R	B12A	4

(*Continued*)

Type	Heater		kV (max.)		Final Anode Max. μA*	Grid Volts (cut-off)	Defl. Angle (deg.)	Volts h-k (max.)	Capacitances (pF to earth)		Screen Diam. (in)	Remarks† IT, A, F, M, R, E	Base	
	Volts	Amps	Final Anode	First Anode					g	k			Type	Ref.
G.E.C. (*Continued*)														
Current Types (Continued)														
7205A	12.6	0.3	14§	0.4	100	−51	85	180	8.5	6.5	14††	IT, A, M, R, E	B12A	19
7405A	12.6	0.3	16§	0.4	100	−51	110	180	6	4.5	17††	A, M, R, E	B8H	1
7502A	12.6	0.3	20	0.4	100	−51	85	180	8.5	6.5	21††	IT, A, M, R	B12A	4
7503A	12.6	0.3	16§	0.4	100	−51	110	180	6	4.5	21††	A, M, R, E	B8H	1
7504A	12.6	0.3	18	0.5	100	−51	110	180	8	4.5	21††	A, M, R, E	B8H	1

§ Maximum third anode voltage 700V.

Type	Heater		kV (max.)		Final Anode Max. μA*	Grid Volts (cut-off)	Defl. Angle (deg.)	Volts h-k (max.)	Capacitances (pF to earth)		Screen Diam. (in)	Remarks† IT, A, F, M, R, E	Base	
	Volts	Amps	Final Anode	First Anode					g	k			Type	Ref.
MULLARD														
Obsolete Types														
MW22-7	6.6	0.6	7	0.4	100	−40	51	150	10	5	9	—	B8B	53
MW22-14	6.3	0.3	9	0.35	100	−40 to −99	51	150	>10	> 5	9	M	B8B	53
MW22-14C	6.3	0.3	9	0.35	100	−44 to −99	51	150	>10	> 5	9	—	B8B	53
MW22-17	6.3	0.3	9	0.41	100	−44 to −99	51	200	6	4	9	—	B12A	1
MW22-18	6.3	0.3	9	0.41	100	−44 to −99	51	200	6	4	9	M	B12A	1
MW31-7	6.3	0.6	7	0.3	100	−40	50.5	150	10	5	12	—	B8B	53
MW31-14C	6.3	0.3	9	0.35	100	−44 to −99	50.5	150	>10	> 5	12	M	B8B	53
MW31-14	6.3	0.3	9	0.35	100	−44 to −99	50.5	150	>10	> 5	12	—	B8B	53
MW31-16	6.3	0.3	9	0.14	100	−44 to −99	50.5	200	6	4	12	IT, M	B12A	1
MW31-17	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	12	—	B12A	1
MW31-18	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	12	M	B12A	1
MW31-20	6.3	0.3	11	0.35	100	−44 to −99	50.5	150	>10	>10	12	A	B8B	53
MW31-21	6.3	0.3	11	0.35	100	−44 to −99	50.5	150	>10	>10	12	A, M	B8B	53
MW31-22	6.3	0.3	11	0.35	100	−44 to −99	50.5	150	>10	>10	12	A	B12A	1
MW31-23	6.3	0.3	11	0.35	100	−44 to −99	50.5	150	>10	>10	12	A, M	B12A	1
MW36-22	6.3	0.3	14	0.41	100	−33 to −72	65	200	6	4	14††	IT, R, M	B12A	1
MW36-24	6.3	0.3	14	0.41	100	−33 to −72	65	200	6	4	14††	IT, M, R	B12A	1
MW43-64	6.3	0.3	16	0.41‡	100	−40 to −86	65	200	> 8	> 6	17††	IT, R, M	B12A	10
Replacement Types														
AW36-20	6.3	0.3	14	0.41	100	−40 to −80	65	200	> 8	> 6	14††	IT, A, M, R, E	B12A	17
AW36-21	6.3	0.3	14	0.41	100	−40 to −80	65	200	> 8	> 6	14††	IT, M, R, E	B12A	17
MW6-2	6.3	0.3	25	—	150	−40 to −90	30.5	125	6.3	6.3	2.5	A, M	side contact	
MW22-16	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	9	IT, M	B12A	1
MW31-74	6.3	0.3	9	0.41	100	−44 to −99	50.5	200	6	4	12	IT, M	B12A	1
MW36-44	6.3	0.3	14	0.41‡	100	−33 to −72	65	200	7	5	14††	IT, M, R	B12A	10
MW41-1	6.3	0.3	14	0.41	100	−39 to −86	56	200	6	4	16	IT, F	B12A	1
MW43-43	6.3	0.3	14	0.41	100	−43 to −77	66	200	> 8	> 6	17††	IT, R	B12A	10
MW53-20	6.3	0.3	18	0.5‡	—	−40 to −80	65	200	> 7	> 5	21††	IT, A, M, R	B12A	10
Current Types														
AW36-80	6.3	0.3	14	0.5	100	−40 to −80	85	200	7	4	14††	IT, A, M, R, E	B12A	17
AW43-80	6.3	0.3	16	0.5	100	−40 to −80	85	200	7	4	17††	IT, A M R, E	B12A	17
AW43-88	6.3	0.3	16	0.5	—	−38 to −94	110	200	6	4	17††	A, M, R, E	B8H	1
AW43-89	6.3	0.3	16	0.7	—	−35 to −75	110	200	7	5	17††	A, M, R, E	B8H	2
AW53-80	6.3	0.3	16	0.5	100	−40 to −80	85	200	7	4	21††	IT, A, M, R, E	B12A	17
AW53-88	6.3	0.3	16	0.5	—	−38 to −94	110	200	6	4	21††	A, M, R, E	B8H	1
AW53-89	6.3	0.3	16	0.7	—	−35 to −75	110	200	6	4	21††	A, M, R, E	B8H	2
MW43-69	6.3	0.3	16	0.41‡	100	−40 to −86	65	100	> 8	> 6	17††	IT, A, M, R	B12A	10
MW43-80	6.3	0.3	16	0.41	100	−40 to −86	85	200	> 8	> 5	17††	IT, A, M, R	B12A	10
MW53-80	6.3	0.3	18	0.5‡	—	−40 to −80	85	200	7	5	21††	IT, A, M, R	B12A	10
20th CENTURY														
Current Types														
M5R-321	6.3	0.5	10	—	100	−60	50	100	9.5	6.5	5††	A, E, F, R	B12A	7
M6S-303	6.3	0.5	10	—	100	−60	50	100	9.5	6.5	6††	A, E, F, S	B12A	7
M60-302	6.3	0.5	15	—	100	−90	45	100	8	6.5	6	A, E, F	B12A	7
M6S-312	6.3	0.5	15	—	100	−90	45	100	8	8	6	A, F	B12A	5

† IT = ion trap ; A = aluminizing ; E = electrostatic focusing ; F = flat screen ; M = external conducting coating ; R = rectangular screen ;
* For highlights. †† Diagonal. ‡ Second anode 0V. S = Square screen. V_{a2} = +200V (focus).

EFFICIENCY DIODES
(For television line scan)

Type	Heater		Peak Inverse Volts*	Peak Anode Current (mA)	Max. Rect. Current (mA)	Peak Cathode Potential		Capacitance (pF) h-k	Base	
	Volts	Amps				h(−) to k*	h(+) to k		Type	Ref.
BRIMAR										
Obsolete Type										
25U4GT	25.0	0.3	3,850	660	138	3,850	385	6.5	IO	109
Replacement Types										
6U4	6.3	1.2	3,850	660	138	3,850	110	8.5	IO	109
PY81/17Z3	17.0	0.3	4,500	450	150	4,500	3,000	3.6	B9A	34
Current Types										
EY83	6.3	1.0	5,000	500	175	5,000	—	2.1	B9A	34
PY83	20.0	0.3	Other data as Type EY83							
COSSOR										
Current Type										
PY81	17.0	0.3	4,500	450	150	4,500	3,000	3.6	B9A	34
EDISWAN MAZDA										
Replacement Types										
U281	28.0	0.2	3,000	600	120	1,000	—	12.5	IO	55
U282	28.0	0.2	4,500	600	120	1,000	—	12.5	IO	121
U301	28.0	0.2	4,500	600	120	4,500	—	—	IO	128
U403	40.0	0.2	1,500	—	—	—	—	11	MO	18
U801	80.0	0.2	1,500	—	—	—	—	14	IO	117
Current Types										
U191	19.0	0.3	5,000	600	120	5,000	—	—	IO	128
U193	19.0	0.3	5,500	450	150	5,500	—	7.9	B9A	34
U251	25.0	0.3	7,000	720	120	7,500	—	3.2	B9A	34
EMITRON										
Obsolete Type										
PY80/19X3	19.0	0.3	4,000	400	180	650	—	—	B9A	18
FERRANTI										
Current Types										
PY83	20.0	0.3	5,000	500	175	5,600	—	9.2	B9A	34
PY88	30.0	0.3	6,000	550	220	6,600	—	2.0	B9A	34
G.E.C.										
Replacement Types										
PY81	17.0	0.3	4,750	450	150	4,500	—	3.6	B9A	34
PY80/U309	19.0	0.3	4,000	1,000	170	700	—	—	B9A	18
U329	25.0	0.3	7,000	720	120	7,500	—	3.2	B9A	34
Current Type										
U339	19.0	0.3	4,500	—	150	—	—	—	IO	128
MARCONI										
Obsolete Type										
U152	19.0	0.3	4,000	400	180	650	160	—	B9A	18
Current Types										
PY81/U153	17.0	0.3	4,750	450	150	4,500	3,000	3.6	B9A	34
PY80/U309	19.0	0.3	4,000	1,000	180	700	—	—	B9A	18
U329	25.0	0.3	7,500	720	120	7,500	—	3.2	B9A	34
MULLARD										
Replacement Types										
PY31	17.0	0.3	1,500	—	125	300	—	—	IO	55
PY80	19.0	0.3	4,000	400	180	650	—	—	B9A	18
PZ30	52.0	0.3	1,500**	—	200	650	—	—	IO	52
Current Types										
PY81	17.0	0.3	4,750	450	150	4,750	—	2.8	B9A	34
PY88	30.0	0.3	6,600	550	220	6,600	—	2.0	B9A	34

** Anode connected to Pin 5.

(Continued)

Type	Heater		Peak Inverse Volts*	Peak Anode Current (mA)	Max. Rect. Current (mA)	Peak Cathode Potential		Capacitance (pF) h-k	Base	
	Volts	Amps				h(−) to k*	h(+) to k		Type	Ref.
TUNGSRAM										
Current Type										
17Z3	17.0	0.3	4,500	450	150	4,500	—	3.6	B9A	34
WESTINGHOUSE										
Current Types										
14D19	—	—	320	unlimited	—	—	—	—	Metal rectifier	
14D24	—	—	400							
14D28	—	—	480							
14D36	—	—	640							
14D134	—	—	1,260							
14D148	—	—	560							

* For 10μsec. pulse duration.

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EXPLANATION OF VALVE-BASE CONNECTIONS

The following pages of valve-base diagrams show all the sets of base connections that are necessary to cover the valves listed in the tables of characteristics. They are grouped into sections according to the base designations (B7G, B8A, B9A, etc.), and within a section each diagram has a code number to the bottom right of it which identifies that particular set of connections.

Thus to find the base connections of a valve listed in the tables, it is first of all necessary to look up the designation in the " Base Type " column, which gives the right section of diagrams, and then the number in the " Base Ref." column, which gives the code number of a particular diagram in that section. For example, to obtain the connections of the 6F33 valve, one would have to turn to the section of diagrams headed " B7G " and then look for diagram No. 21.

British and American bases which are not interchangeable are given their standard designations. American bases which are interchangeable with British are in some cases given the British designations. Thus, B7G is used to cover both British and American miniature 7-pin bases and B9A for the British 9-pin and the American Noval. The term International Octal (IO) is used to cover both the British B8-O designation and the American standard Octal.

The designation B8B is now out of date ; however, it is used here to cover the British B8G base and the American Loctal and Lock-in types. None of these is identical but the differences are so slight that all will fit the same valveholder. The differences are concerned chiefly with minor points about the spigot material, spigot taper and so on.

Three British bases are given arbitrary designations because there are no standard ones short enough. They are the small 4- and 5-pin (Sm4 and Sm5) bases fitted to some hearing-aid valves and the side-contact base (Ct8) of continental origin and now obsolete.

Care must be taken to distinguish between the IO and MO bases, particularly as the latter is sometimes called the British Octal and is now designated B8-MO. The two differ in pin spacing and in spigot size and are *not* interchangeable. The MO is used by one manufacturer only and has the larger diameter spigot of the two.

The abbreviations used for the connections are substantially in accordance with British Standards Specification BS1409. Some additional abbreviations, however, have had to be introduced.

Similar electrodes which operate in turn on the same electron stream are numbered in order from the cathode, the numbers being appended as subscripts to the electrode symbols.

Similar electrode systems in multiple valves are distinguished by a single tick (′) for the first electrode system, by a double tick (″) for the second, and so on, the ticks being appended to the appropriate electrode symbols.

Dissimilar electrode systems in multiple valves are distinguished by additional letter subscripts appended to the symbols for the less complex electrode structures.

A number against a pin indicates that it is joined internally to the pin of that number.

Where more than one electrode is joined internally to the same pin only the electrode of major importance is usually designated. Thus, the suppressor grid of a pentode is not always shown when it is joined internally to cathode or filament negative. An exception is made when it may be important to the user to know precisely which electrodes are joined together.

No distinction is normally made between valves with and without external metal screens. The base connections show an " M " for such a screen in cases where all or only some valves have it, but others with the same code reference may have no such screen or an internal screen. The " M " pin should, therefore, normally be earthed.

Some valves have the suffix " Met " to their numbers and are listed separately ; but generally they are equivalent to the valves without such a suffix.

Abbreviations

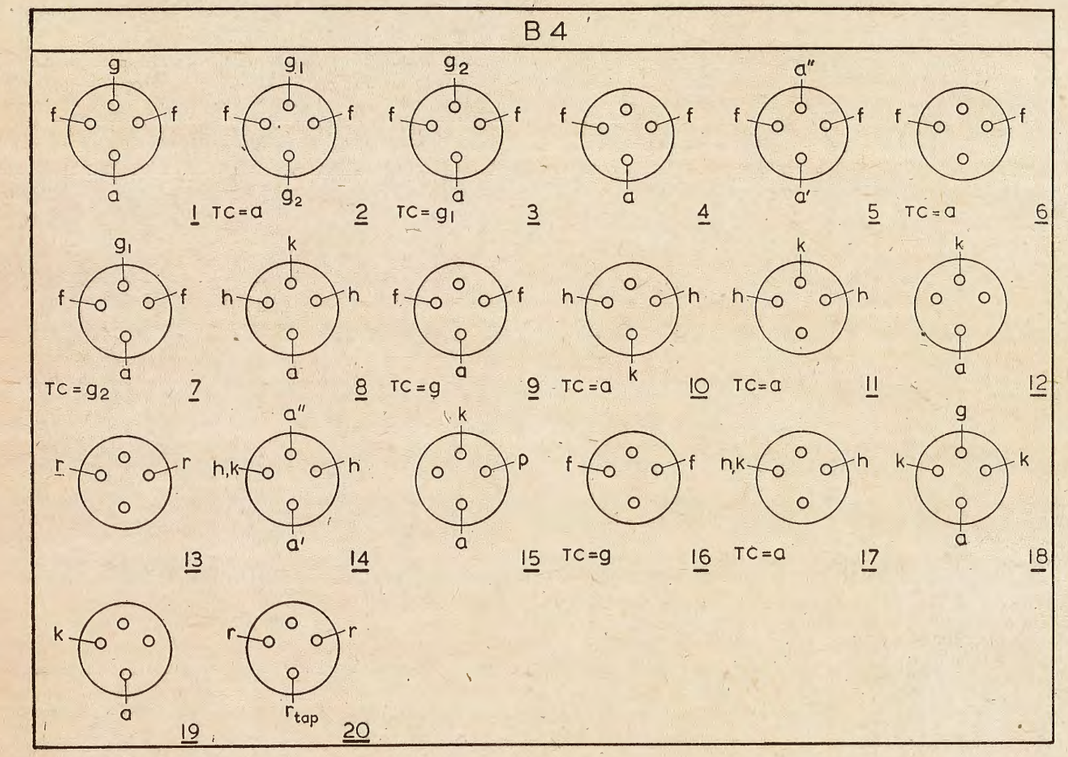
for Valve-base Connections

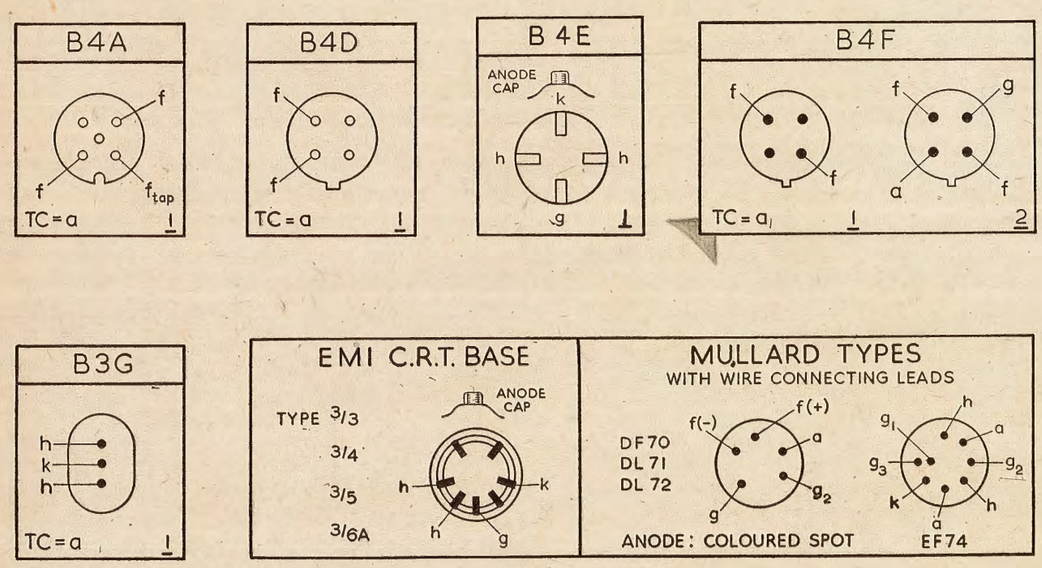
MAIN SYMBOLS

a	= anode
bp	= beam plates
ce	= control electrode
f	= filament
g	= grid
h	= heater
ic	= internal connection (external connections must not be made to a pin so designated)
jp	= jumper
k	= cathode
M	= external conducting coating
m	= internal conducting coating
p	= priming electode
r	= resistance
s	= internal shield
st	= spark trap
t	= target
tr	= trigger
TC	= top cap
SC	= side cap

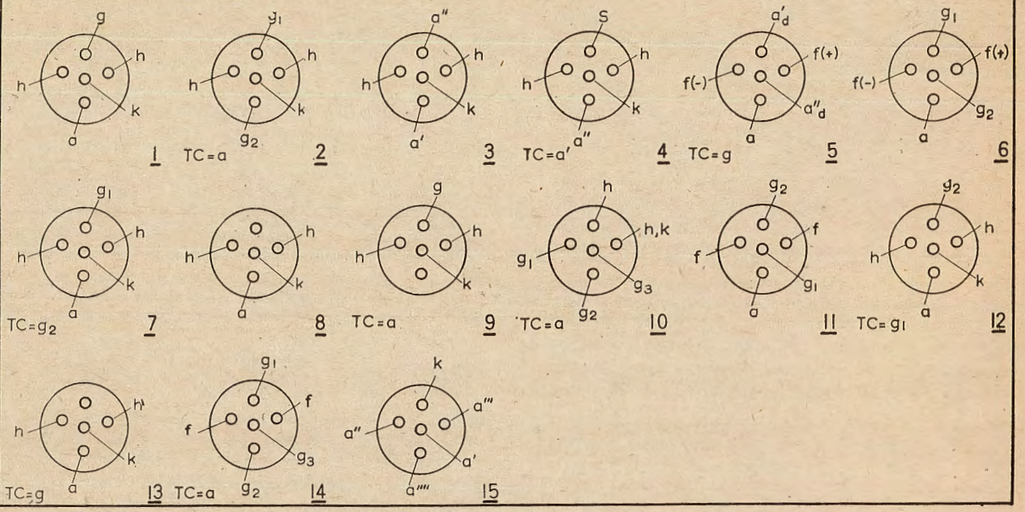
SUBSCRIPT SYMBOLS

d	= diode
p	= pentode
r	= rectifier
t	= triode
tap	= filament or heater tapping
(+)	= positive
(−)	= negative





B5



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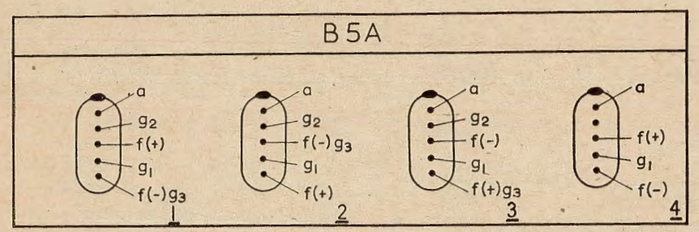
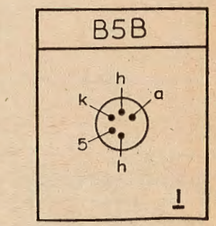
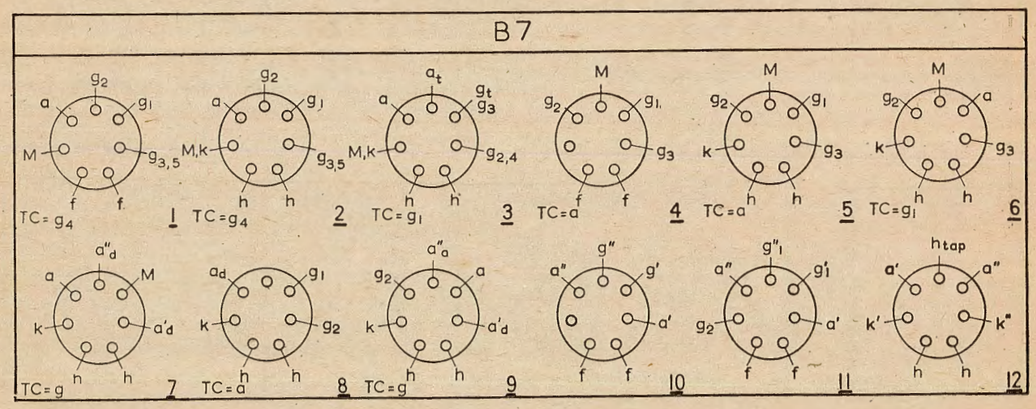


B5B



B7



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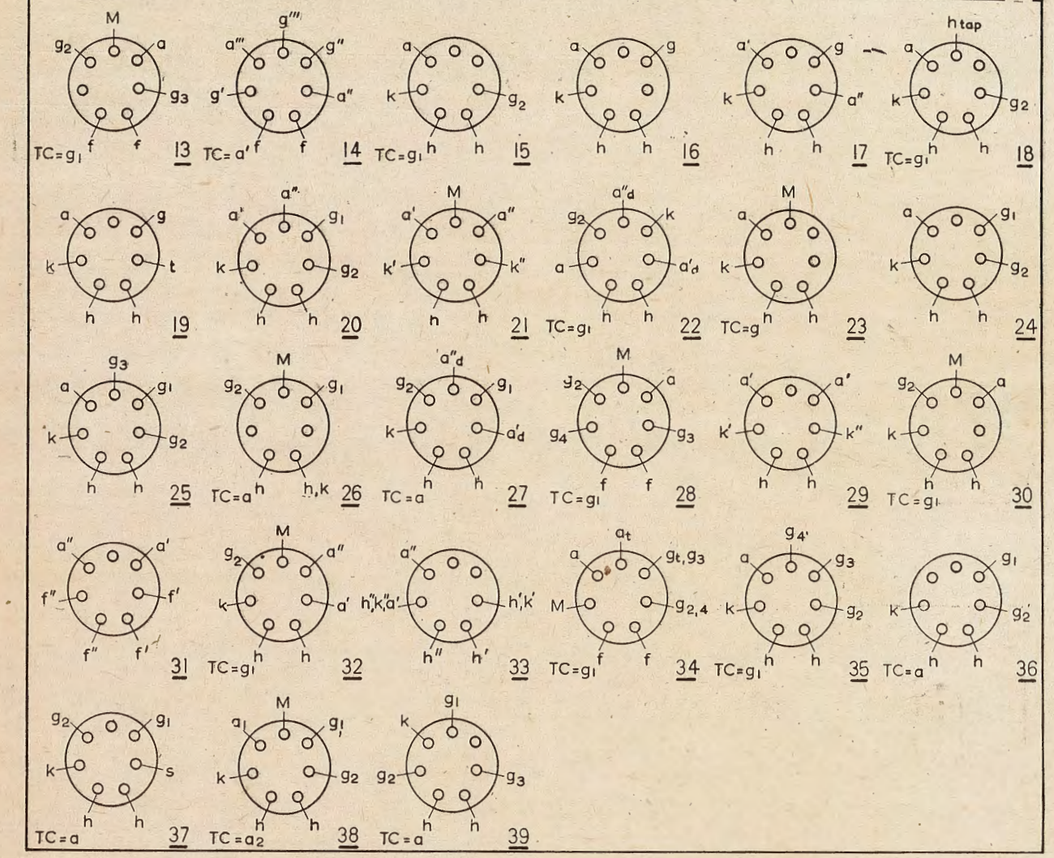
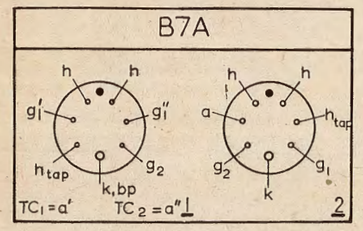
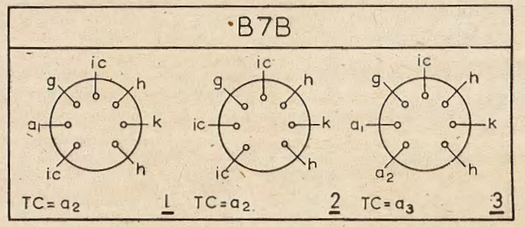


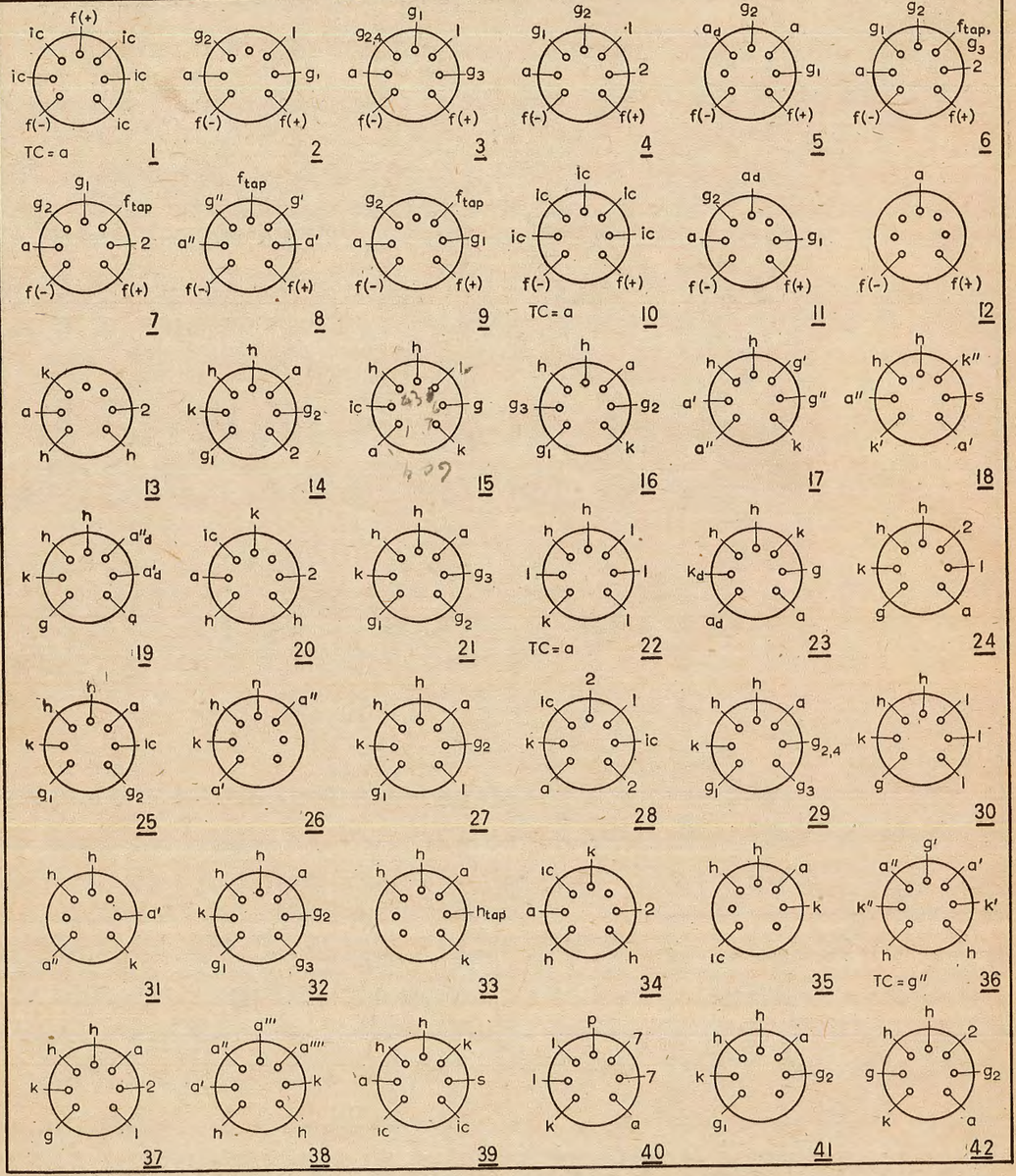
B7A



B7B



B7G



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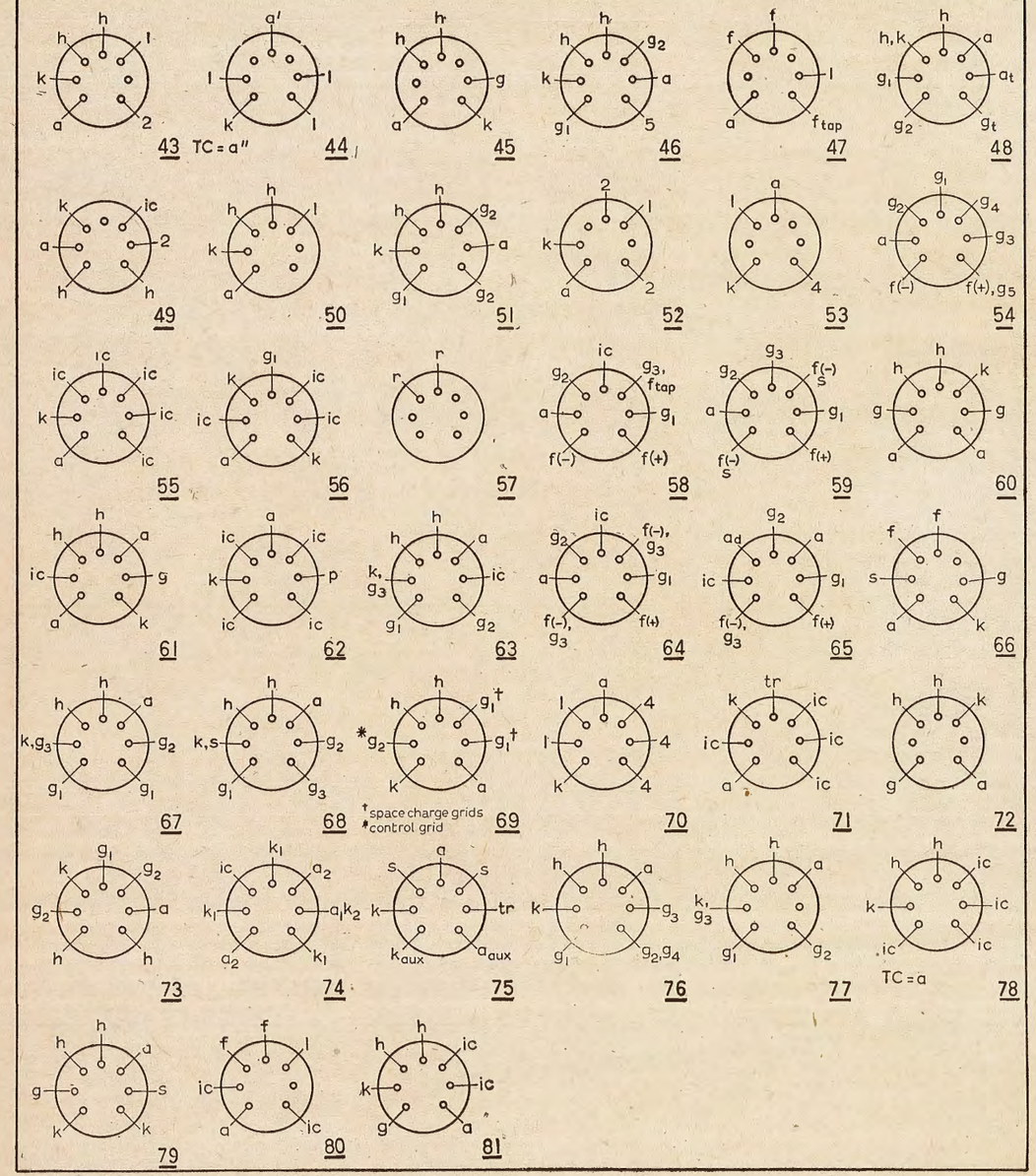
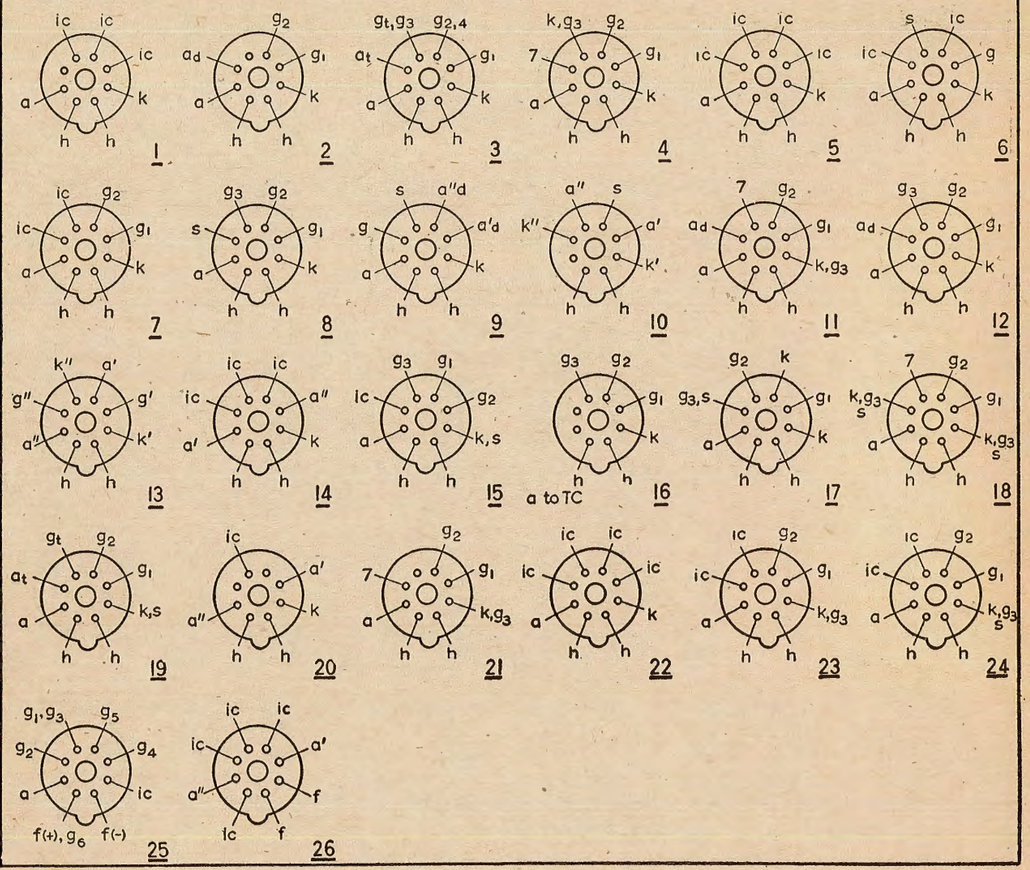
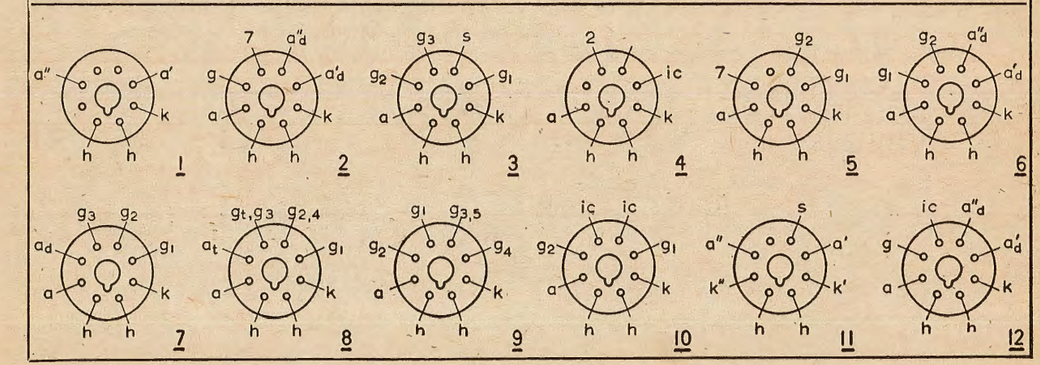


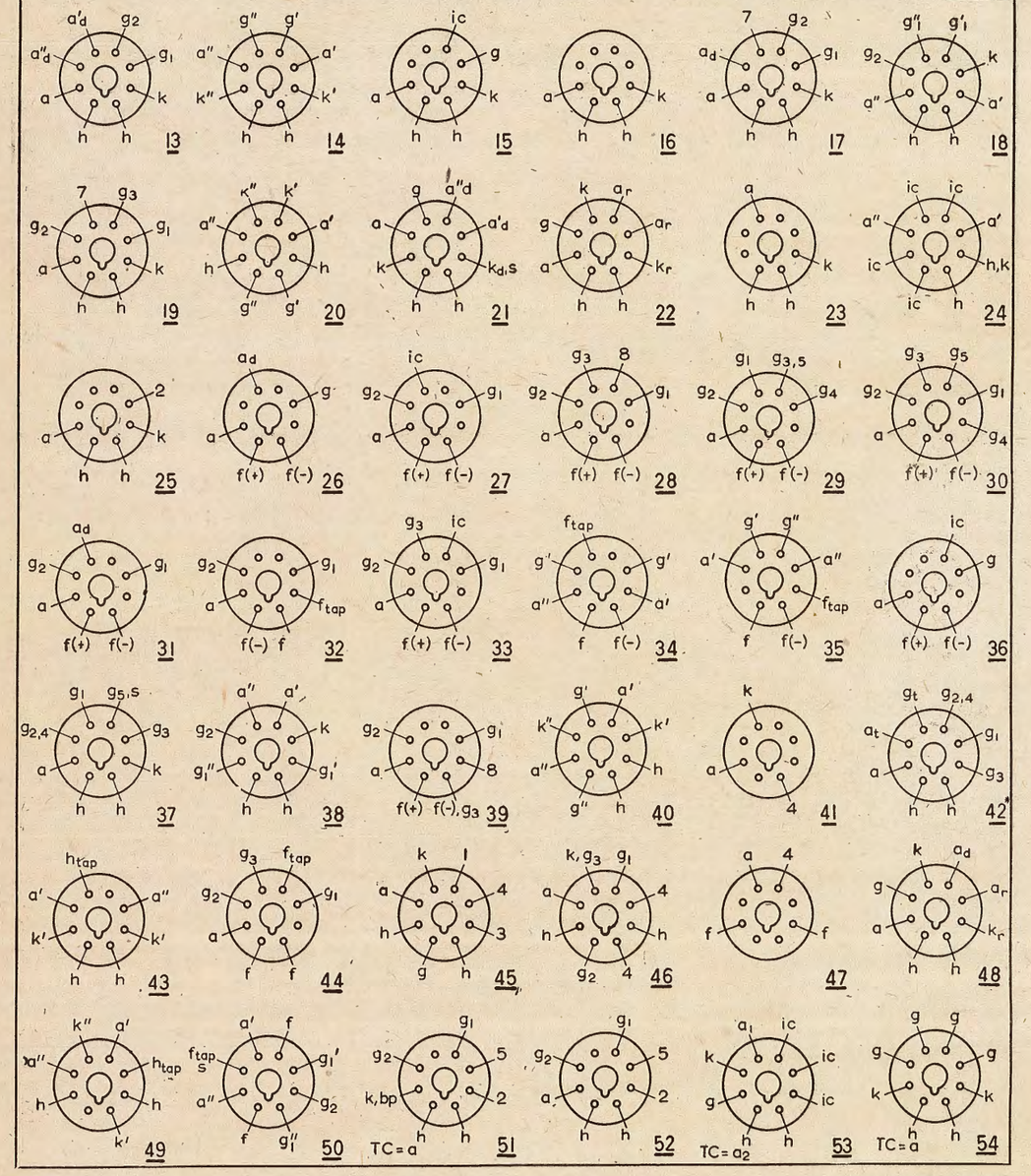
B8A



B8B (LOCTAL)

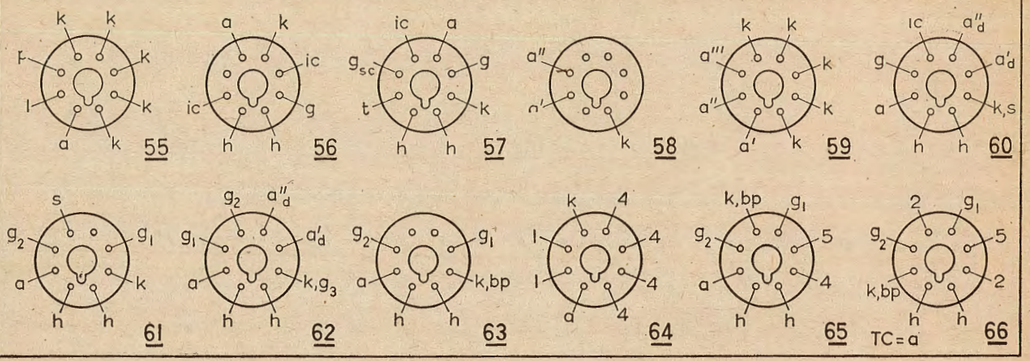


B8B (Continued)

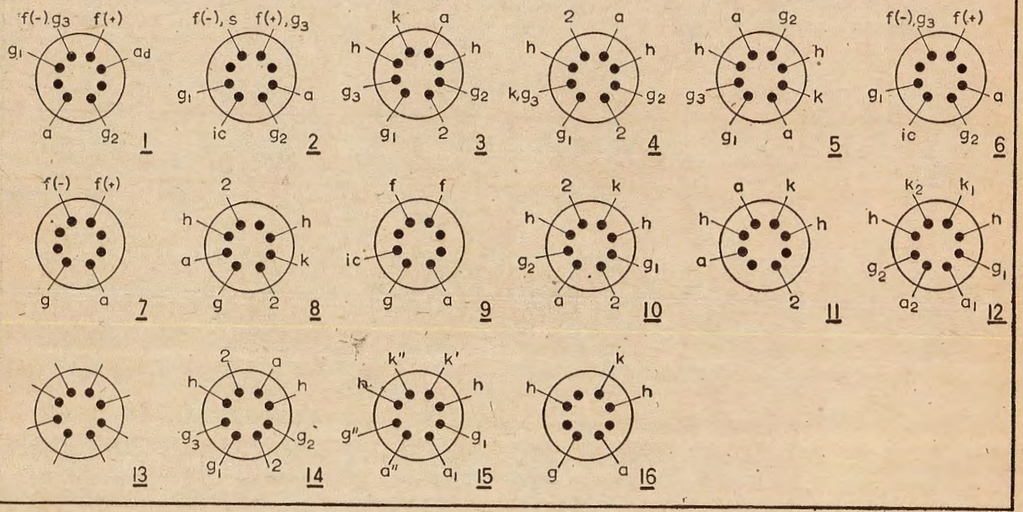


*k and g_5 to centre spigot

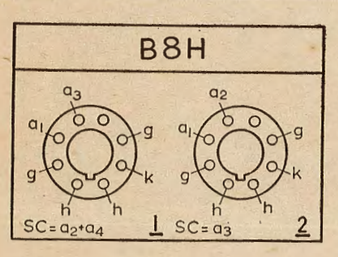
B8B (Continued)



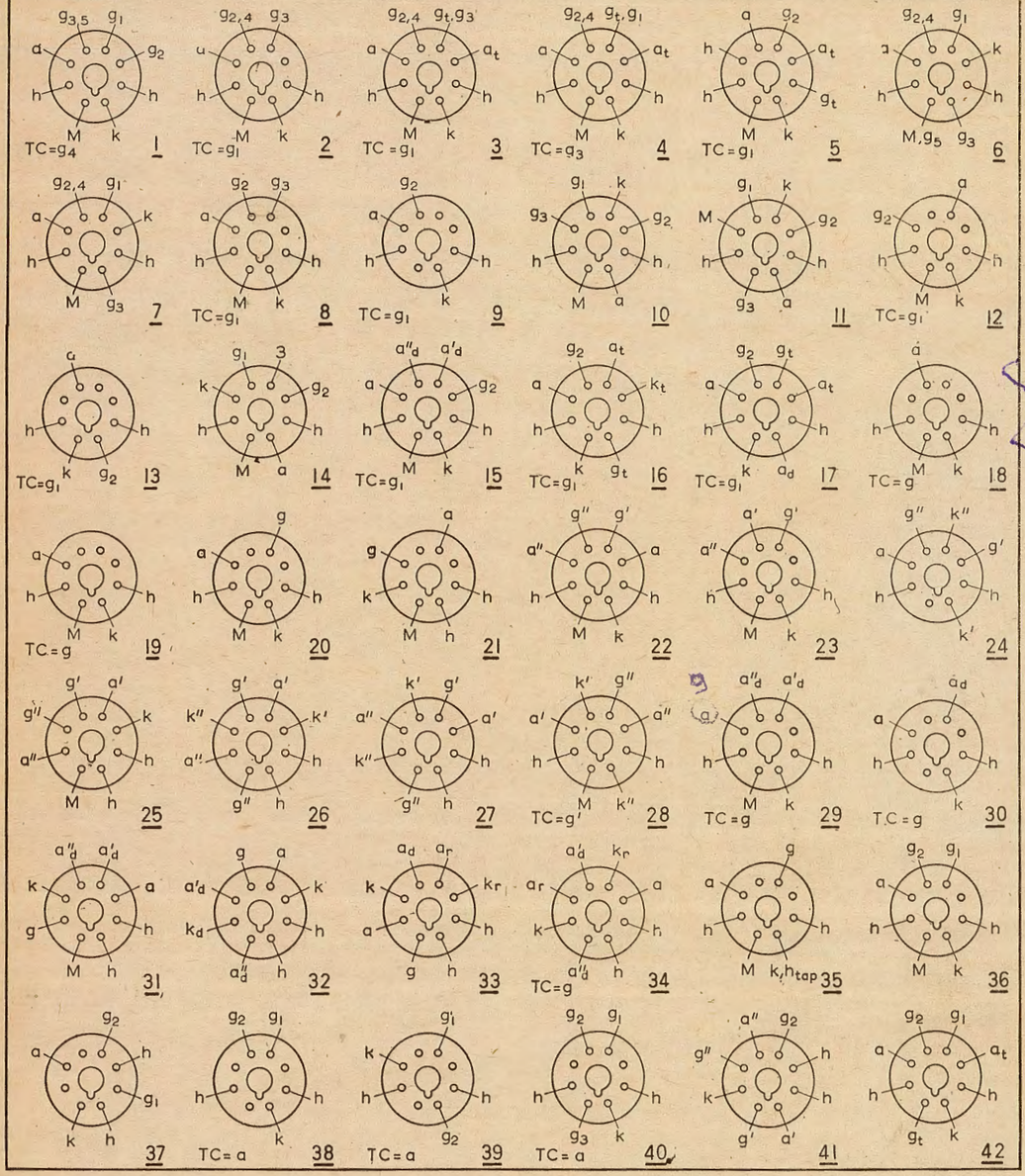
B8D



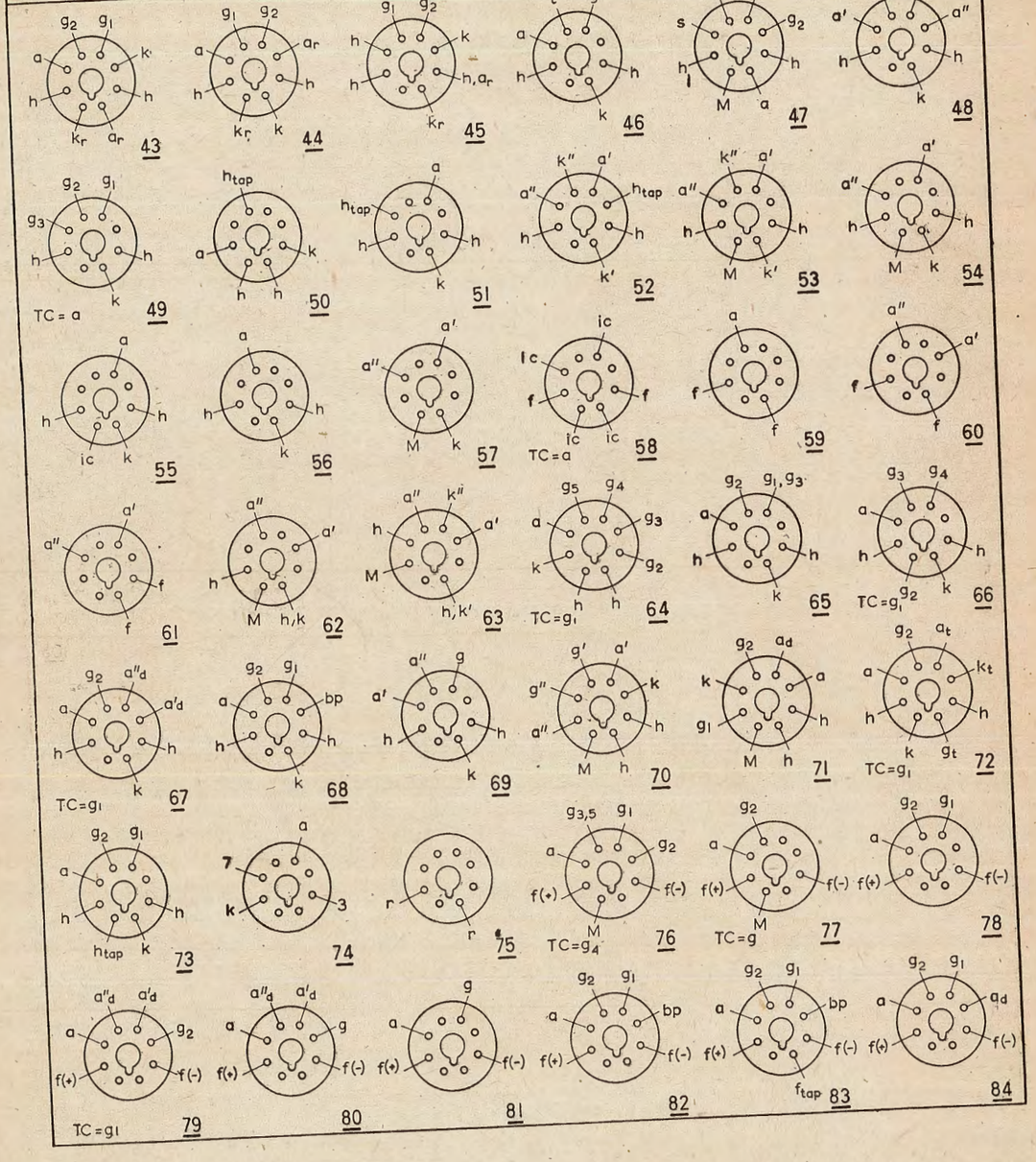
B8H



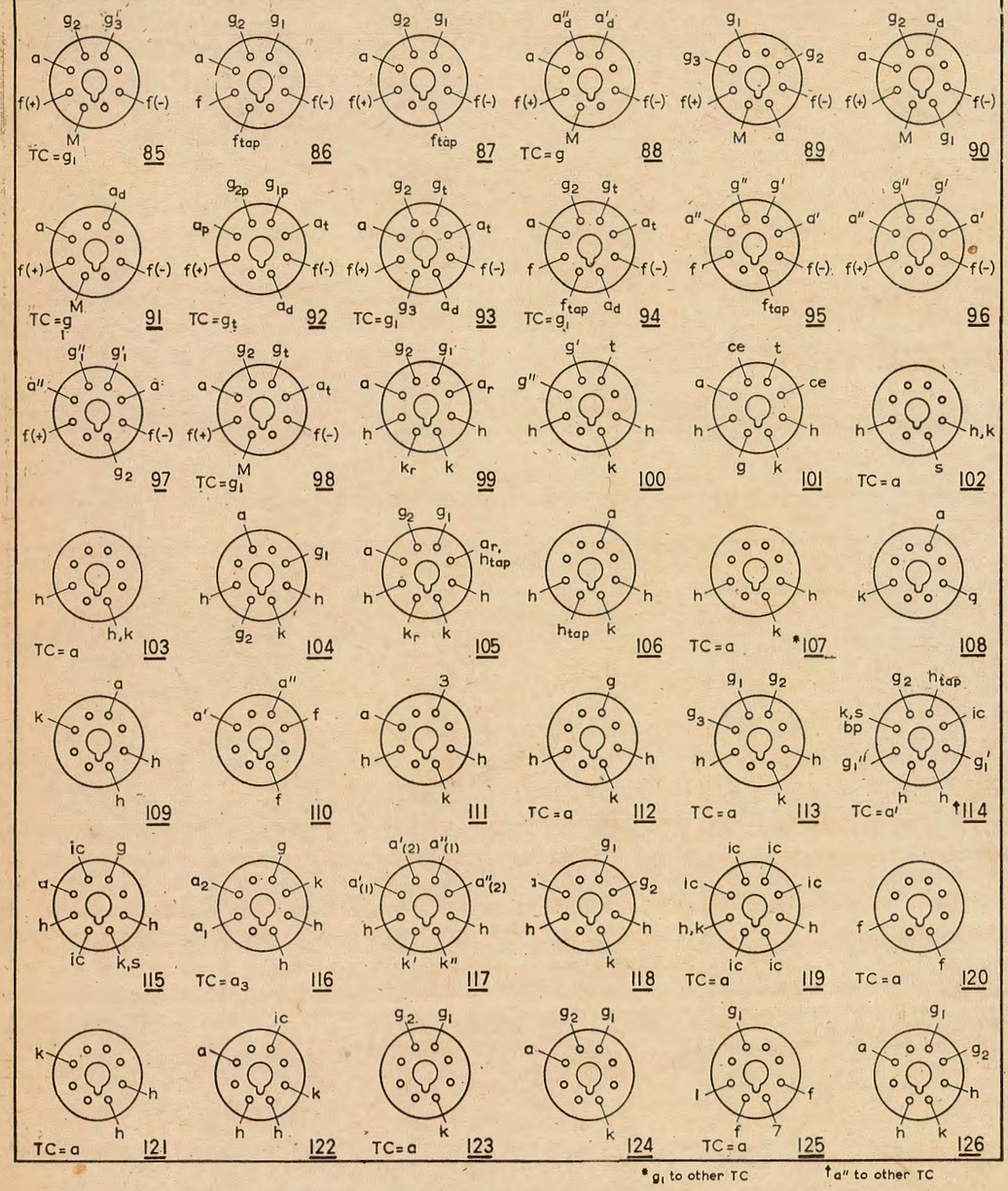
10 (INTERNATIONAL OCTAL)



10 (Continued)



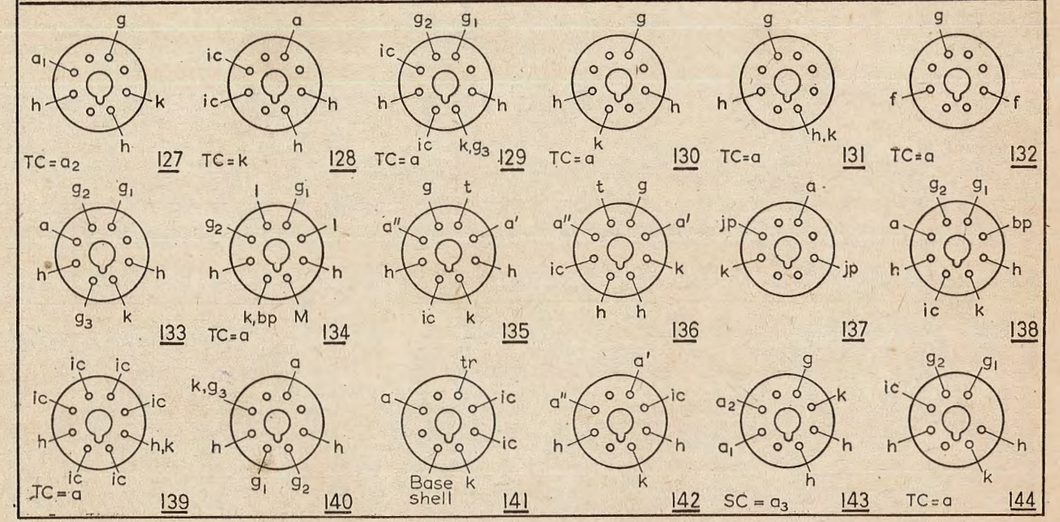
10 (continued)



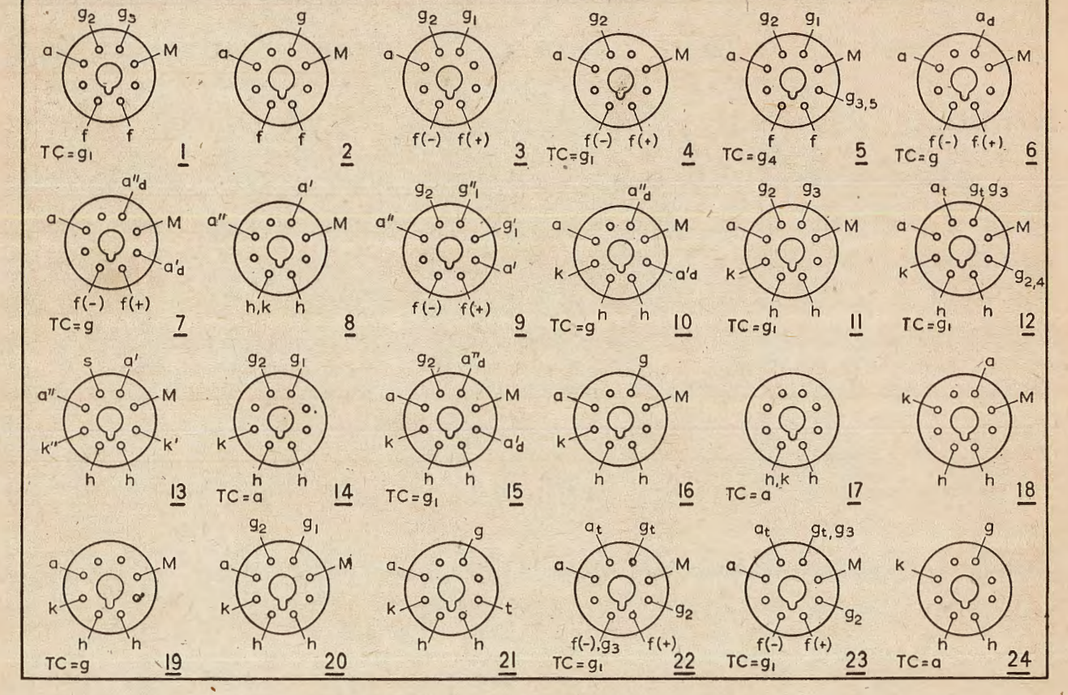
*g1 to other TC

†a'' to other TC

10 (continued)



MO (MAZDA OCTAL)



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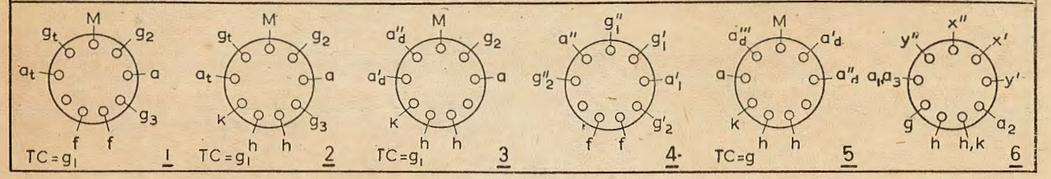

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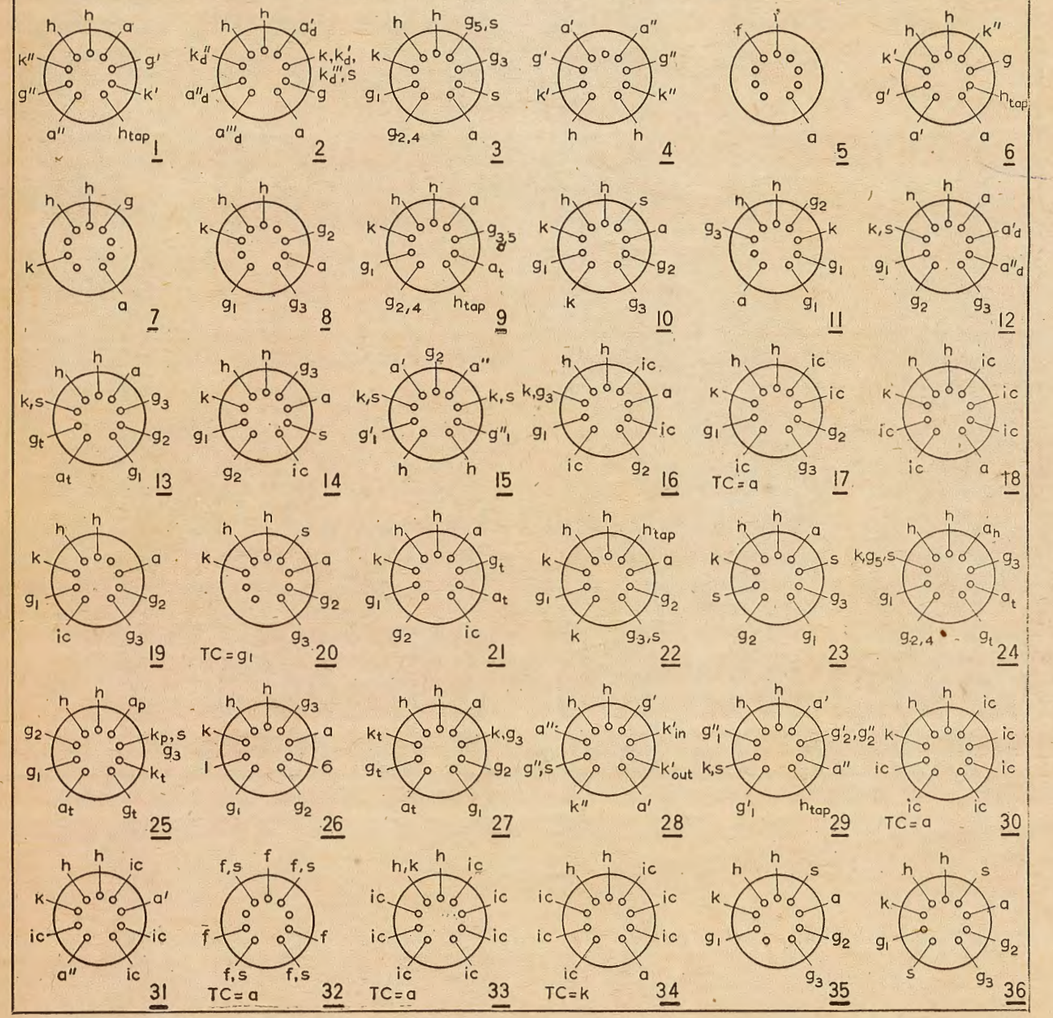
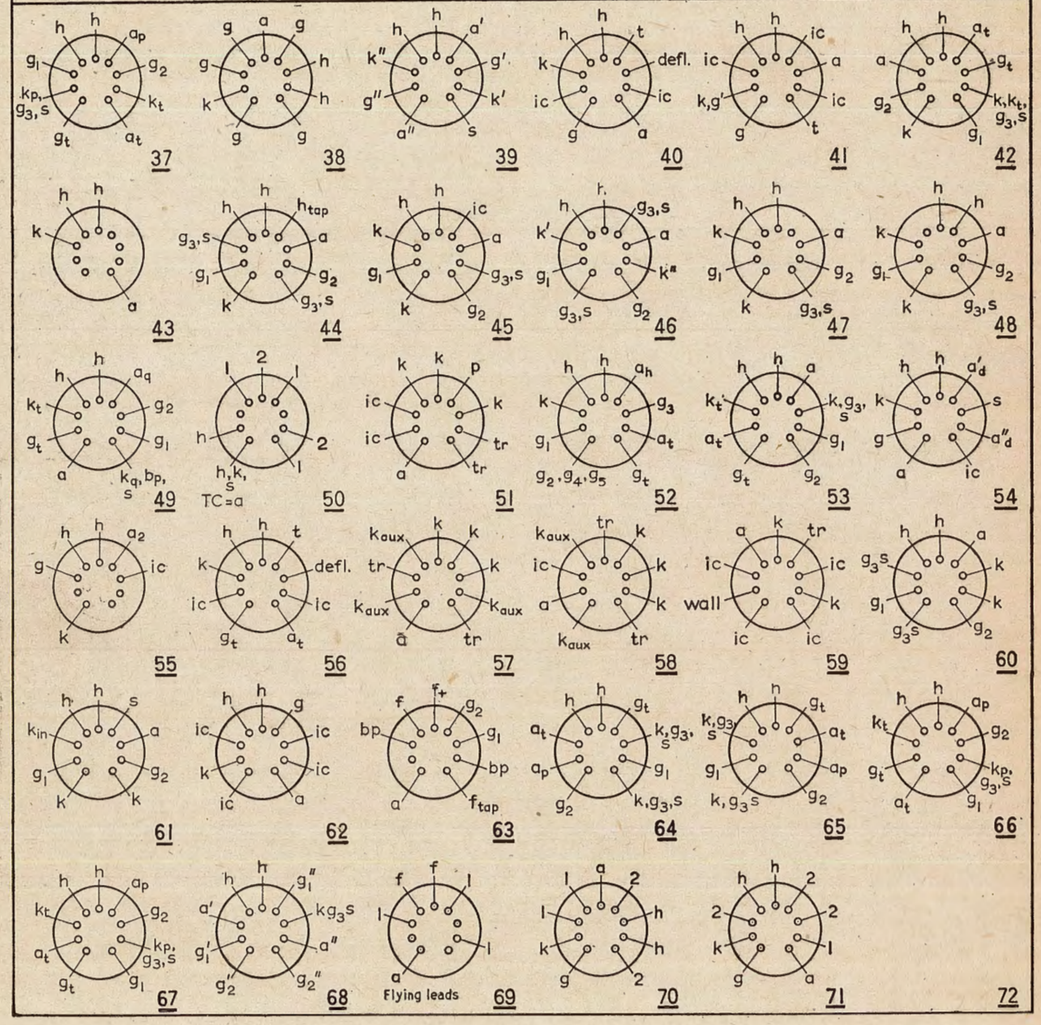


B9A (Continued)



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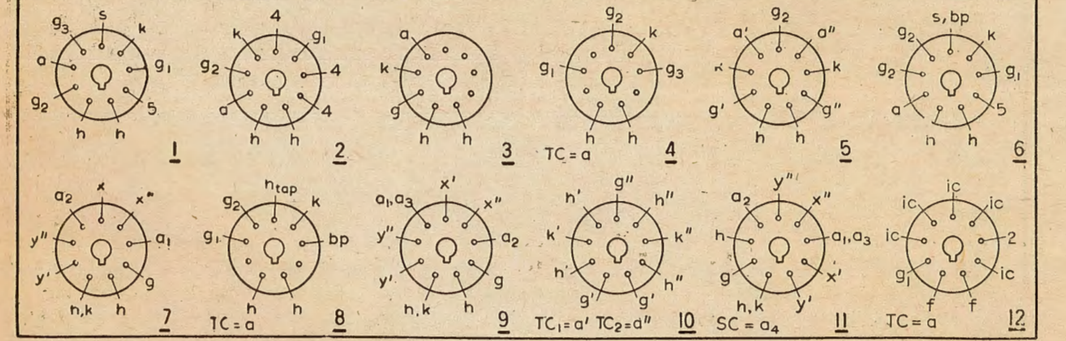
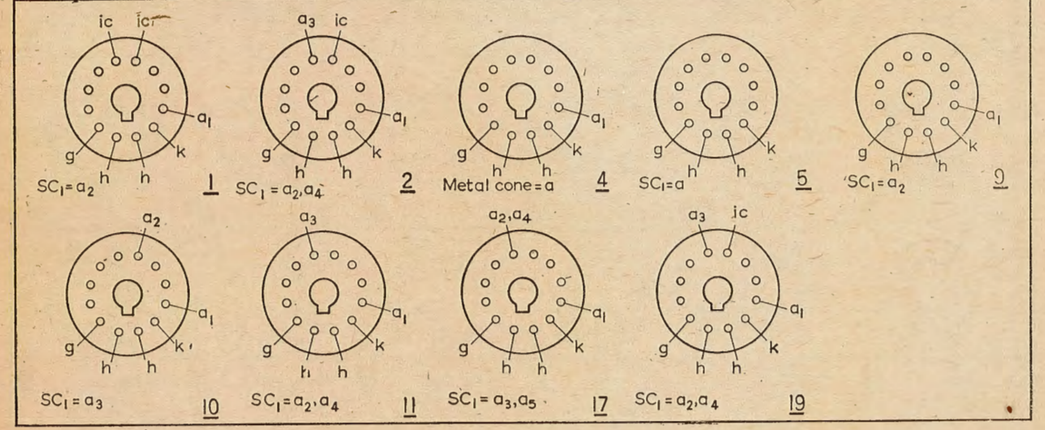
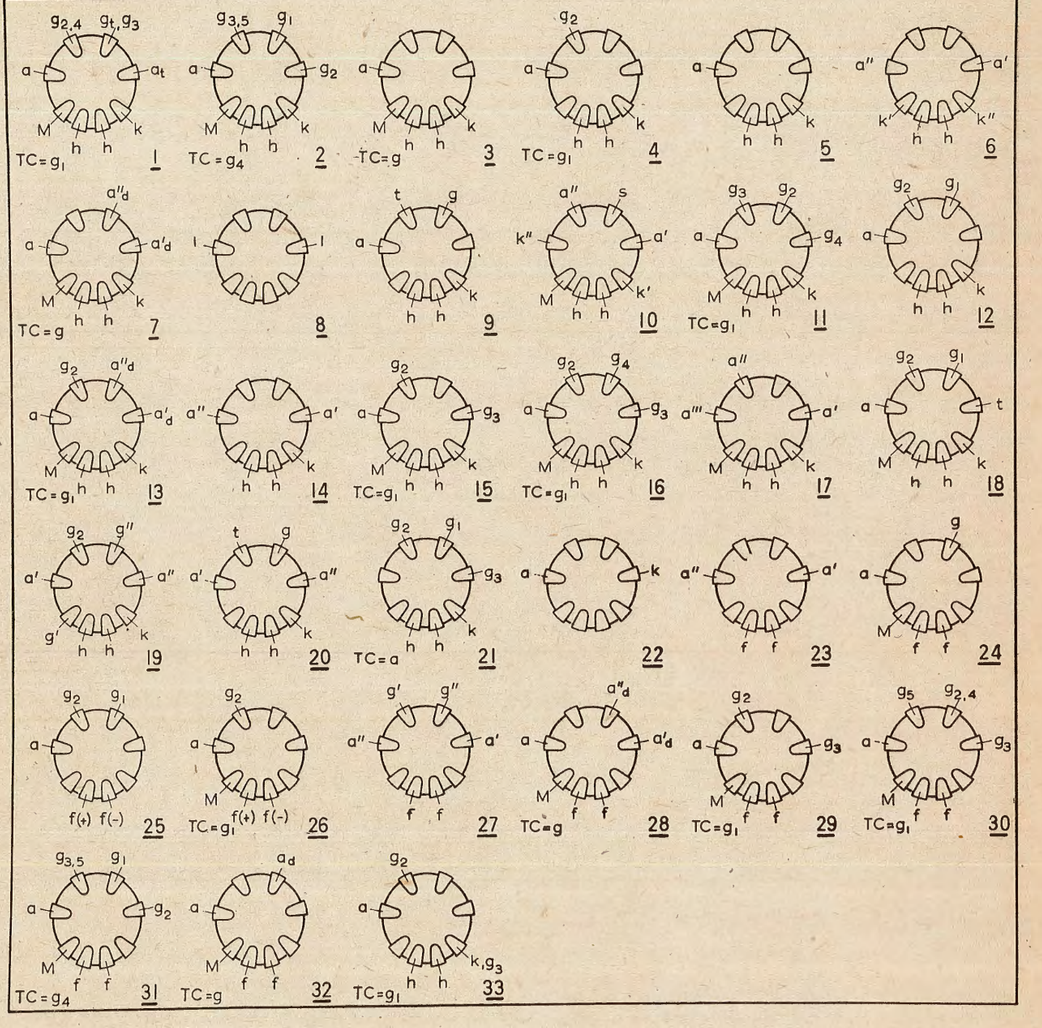


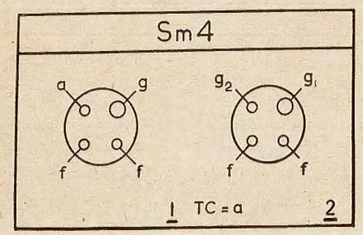
B12A



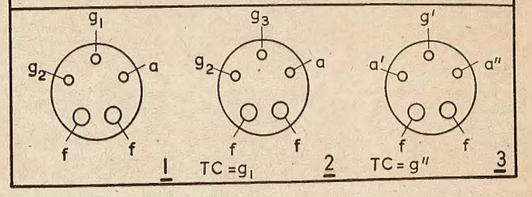
Ct 8 (SIDE CONTACT)



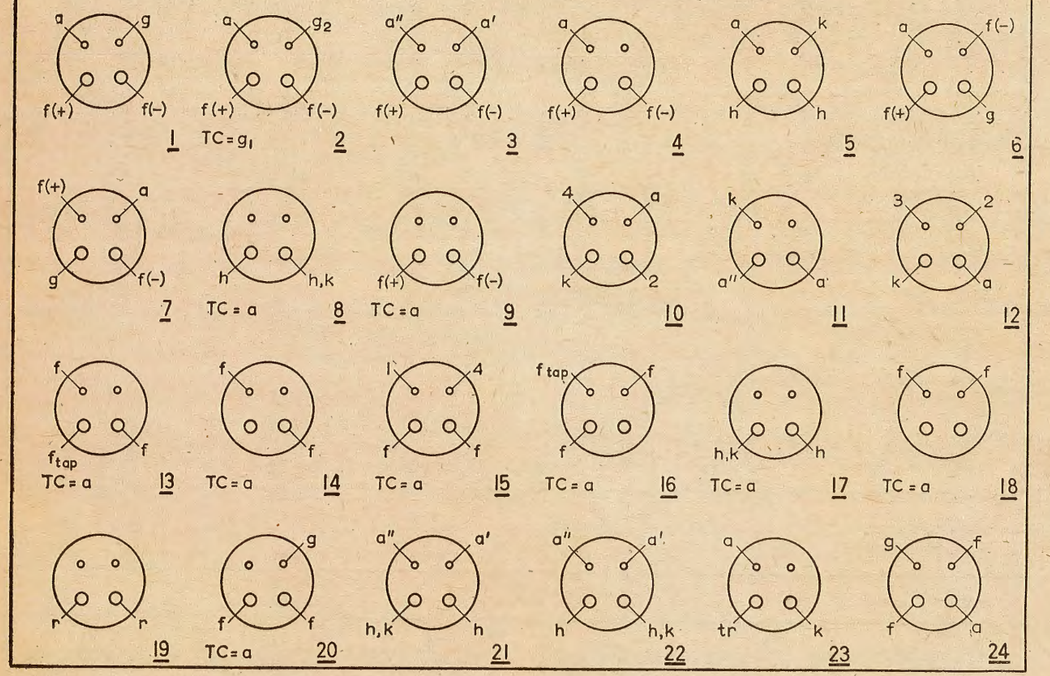
Sm 4



Sm 5



U X 4



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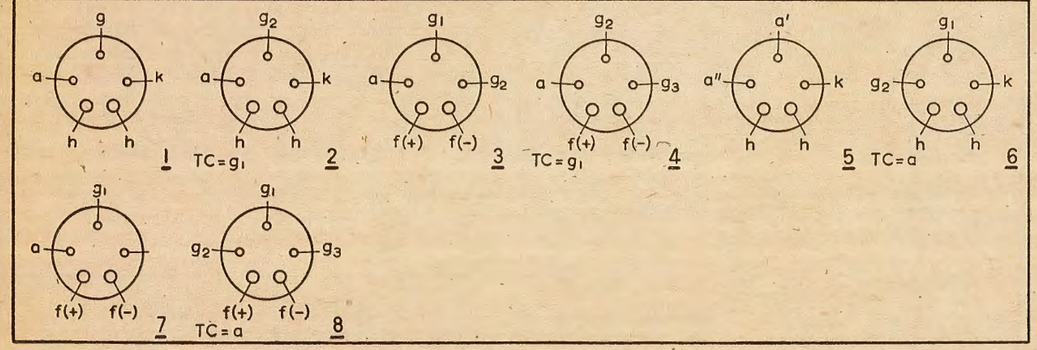
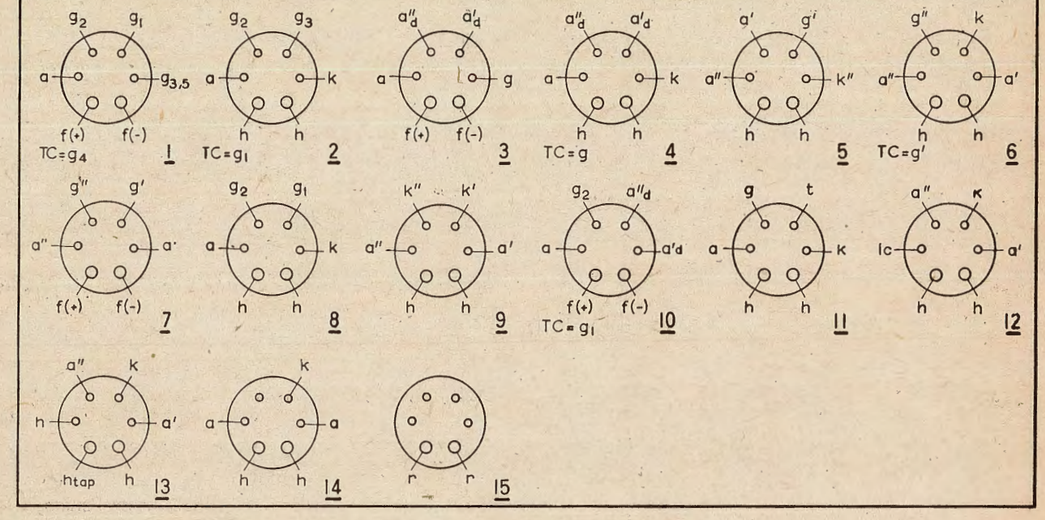
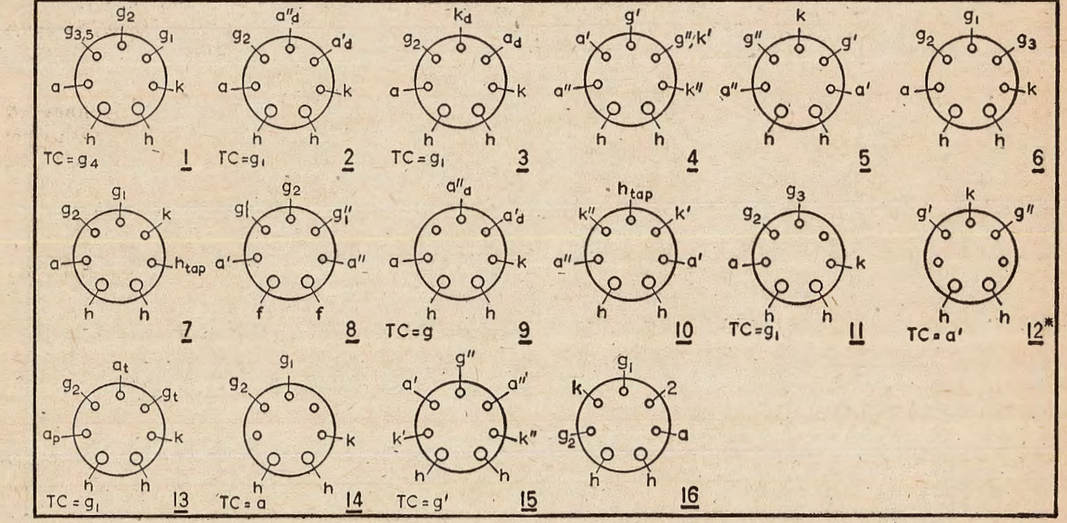


UX6



UX7



*a" to other TC

TRADE NAMES AND MANUFACTURERS' ADDRESSES

A.E.I.	Associated Electrical Industries Ltd., Electronic Apparatus Division, Carholme Road, Lincoln.
BRIMAR	Brimar Ltd., Footscray, Sidcup, Kent.
CATHODEON	Cathodeon Electronic, Ltd., Bircham Road, Southend-on-Sea, Essex.
COSSOR	Cossor Valve Company Ltd., Cossor House, Highbury Grove, London, N.5.
EDISWAN MAZDA ..	Associated Electrical Industries Ltd., Radio and Electronic Components Division, 155, Charing Cross Road, London, W.C.2.
EMISCOPE, EMITRON, ETEL	Electronic Tubes, Ltd., Kingsmead Works, High Wycombe, Bucks.
ENGLISH ELECTRIC..	English Electric Valve Co., Ltd., Waterhouse Lane, Chelmsford, Essex.
FERRANTI	Ferranti Ltd., Gem Mill, Chadderton, Oldham, Lancs.
G.E.C.	
Valves and C.R.T.S.	M-O Valve Co., Ltd., Brook Green Works, Hammersmith, London, W.6.
Semiconductor products	Associated Semiconductor Manufacturers Ltd., Broadstone Works, Reddish, Stockport, Cheshire.
HIVAC	Hivac, Ltd., Stonefield Way, Victoria Road. South Ruislip, Middx.
MARCONI	Electronic Tubes, Ltd., Kingsmead Works, High Wycombe, Bucks.
MULLARD	Mullard, Ltd., Mullard House, Torrington Place, London, W.C.1.
NEWMARKET-PYE ..	Newmarket Transistor Co., Ltd., Exning Road, Newmarket. Suffolk.
R.C.A.	R.C.A. Great Britain, Ltd., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex.
SEMICONDUCTORS ..	Semiconductors, Ltd., Cheney Manor, Swindon, Wilts.
S.T.C.	Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.
TEXAS	Texas Instruments, Ltd., Manton Lane, Bedford.
TUNGSRAM	British Tungsram Radio Works, Ltd., West Road, Tottenham, London, N.17.
20th CENTURY ..	20th Century Electronics, Ltd., King Henry's Drive, New Addington, Croydon, Surrey.
WESTINGHOUSE ..	Westinghouse Brake & Signal Co., Ltd., 82 York Way, Kings Cross, London, N.1.

INDEX AND VALVE EQUIVALENTS

Valve	Base	Pages	Equivalents
O (ZERO)—All entries under "**zero**" and "**O**" will be found together under **O** in the alphabetic section of the index. Where individual manufacturers have indicated either zero or **O** this has been followed in the tables.			
1A3	B7G-13	**45**	DA 90, 1D13
1A4	UX4-2	**25**	
1A5	IO-78	**26, 29, 35**	
1A6	UX6-1	**14**	
1A7	IO-76	**7, 11, 14**	X14, DK32
1A8	IO-94	**24**	
1AB5	B8B-39	**24**	
1AB6	B7G-54	**13**	DK96
1AB6/DK96	B7G-54	**9**	
1AC5	Wires	**35**	
1AC6	B7G-54	**7, 13**	X18, 1C2, DK92
1AC6/DK92	B7G-54	**9**	
1AD4	Wires	**24**	
1AD5	Wires	**24**	
1AE5	Wires	**14**	
1AH5	B7G-5	**15, 24**	see DAF96, 1FD1, 1P1
1AJ4	B7G-2	**15, 24**	DF96, 1F1
1B3	IO-58	**88**	
1B4	UX4-2	**25**	
1B5L	UX6-3	**67**	
1B7	IO-76	**14**	
1B8	IO-92	**35**	
1B47	B7G-28	**92**	
1B48	—	**76**	
1C1	B7G-3	**8**	X17, 1R5, DK91
1C2	B7G-54	**9**	1AC6, X18, DK92
1C3	B7G-54	**9**	DK96
1C5	IO-78	**26, 27, 29, 33, 34, 35**	DL35, N14
1C6	UX6-1	**14**	
1C8	—	**14**	
1C21	IO-108	**92**	
1D5	B5-8	**71**	405UA, RZ, UR1C
1D6	UX6-14	**71**	
1D7	IO-76	**14**	see 1A6
1D8	IO-92	**35**	
1D13	B7G-13	**44**	1A3, DA90
1E4	IO-81	**67**	
1E5	IO-77	**25**	
1E7	IO-97	**42**	
1E8	Wires	**14**	
1F1	B7G-64	**17**	DF96, 1AJ4
1F2	B7G-2	**17**	1L4, DF92
1F3	B7G-2	**17**	W17, DF91, 1T4
1F4	UX5-3	**35**	
1F5	IO-78	**35**	KL35
1F6	UX6-10	**25**	
1F7	IO-79	**25**	
1FD1	B7G-65	**17**	DAF96, 1AH5
1FD9	B7G-5	**17**	1S5, ZD17, DAF91
1G4	IO-81	**67**	
1G5	IO-78	**35**	
1G6	IO-96	**42, 62**	
1H4	IO-81	**67**	
1H5	IO-91	**59, 60, 62, 65, 67**	HD14, DAC32
1H6	IO-80	**67**	see 1B5L
1J5	IO-78	**35**	
1J6	IO-96	**42**	
1L4	B7G-2	**15, 17, 24**	1F2, DF92
1LA4	B8B-27	**35**	
1LA6	B8B-29	**7, 14**	
1LB4	B8B-27	**35**	
1LB6	B8B-30	**14**	
1LC5	B8B-28	**24**	
1LC6	B8B-29	**14**	
1LD5	B8B-31	**15, 24**	
1LE3	B8B-36	**67**	
1LG5	B8B-33	**24**	
1LH4	B8B-26	**67**	see 1H5
1LN5	B8B-28	**15, 24**	
1M1	B8D-9	**88**	Y25, DM70, 1M3
1M3	B8D-9	**89**	see DM70
1N5	IO-77	**16, 18, 22, 24**	Z14, DF33
1N6	IO-84	**35**	
1N650	—	**47**	
1N651	—	**47**	
1N652	—	**47**	
1N653	—	**47**	
1N1130	—	**86**	
1N1131	—	**86**	
P1	B7G-9	**28, 38**	DL96, 3C4
1P5	IO-77	**25**	
1P10	B7G-6	**28**	3S4, N17, DL92, 3Q4
1P11	B7G-9	**28**	3V4, DL94
1Q5	IO-78	**35**	
1R4	B8B-23	**45**	
1R5	B7G-3	**7, 13**	DK91, X17, 1C1
1R5/DK91	B7G-3	**9**	
1RE2-1-8-1	—	**80**	
1S001	—	**85**	
1S002	—	**85**	
1S003	—	**85**	
1S004	—	**85**	
1S005	—	**85**	
1S4	B7G-4	**26, 34, 35, 36**	DL91
1S5	B7G-5	**15, 17, 18, 24**	ZD17, 1FD9, DAF91
1S5/DAF91	B7G-5	**18**	
1S101	—	**85**	
1S103	—	**85**	
1S105	—	**85**	
1S107	—	**85**	
1S111	—	**85**	
1S113	—	**85**	
1S115	—	**85**	
1S121	—	**47**	
1S401	—	**85**	
1S402	—	**85**	
1S403	—	**85**	
1S404	—	**85**	
1S405	—	**85**	
1S600	—	**85**	
1S601	—	**85**	
1S602	—	**85**	
1S603	—	**85**	
1S604	—	**85**	
1S610	—	**85**	
1S611	—	**85**	
1S612	—	**85**	
1S613	—	**85**	
1S614	—	**85**	
1S701	—	**47**	
1S914	—	**47**	
1S916	—	**47**	
1S5015	—	**94**	
1S5016	—	**94**	
1S5018	—	**94**	
1S5020	—	**94**	
1S5022	—	**94**	
1S5024	—	**94**	
1S5027	—	**94**	
1S5030	—	**94**	
1S5033	—	**94**	
1S5036	—	**94**	
1S5039	—	**94**	
1S5043	—	**94**	
1S5047	—	**94**	
1S5051	—	**95**	
1S5056	—	**95**	
1S5062	—	**95**	
1S5068	—	**95**	
1S5075	—	**95**	
1S5082	—	**95**	
1S5091	—	**95**	
1S5100	—	**95**	
1S5110	—	**95**	
1S5120	—	**95**	
1S5130	—	**95**	
1S5150	—	**95**	
1S7033	—	**95**	
1S7036	—	**95**	
1S7039	—	**95**	
1S7043	—	**95**	
1S7047A	—	**95**	
1S7051A	—	**95**	
1S7056A	—	**95**	
1S7062A	—	**95**	
1S7068A	—	**95**	
1S7075A	—	**95**	
1S7082A	—	**95**	
1S7091	—	**95**	
1S7100	—	**95**	
1S7110	—	**95**	
1S7120	—	**95**	
1S7130	—	**95**	
1S7150A	—	**95**	
1SA6	IO-89	**25**	
1T2	Wires	**86**	see R16
1T4	B7G-2	**15, 17, 18, 24**	W17, 1F3, DF91, W17
1T4/DF91	B7G-2	**18**	
1T5	IO-78	**35**	
1T6	Wires	**24**	
1U4	B7G-2	**25**	
1U5	B7G-11	**15**	
1V2	B9A-5	**76**	
1V5	Wires	**35**	
1W4-350	B4-14	**74**	R3, 431U, MU14, UU5, R43
1W4-500	B4-14	**74**	R3, 431U, MU14, UU5, R43
1W5	Wires	**24**	
1X2B	B9A-32	**86**	see R19
1Z2	B7G-10	**88**	
2A3	UX4-1	**26, 36, 42**	
2A5	UX6-8	**34**	
2A6	UX6-4	**66, 67**	

AVO Valve Characteristic Meter MK. IV

One valve can play an important part in complex electrical circuitry. The Avo Valve Characteristic Meter has been designed to test any standard receiving or transmitting valve having up to a maximum anode dissipation of 25W. Inter-electrode insulation, anode current, mutual conductance and "gas" current can be measured and, by making a series of tests, complete families of curves may be plotted. Rectifiers and signal diodes are tested under suitable load conditions.

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Heater Current	...	3A max.
Anode Current	...	100mA max.
Mutual Conductance	...	0.1-60mA/V max.
Negative Grid Voltage	...	0-100V in 9 ranges
"Gas" Current	...	2μA first indication

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VC7

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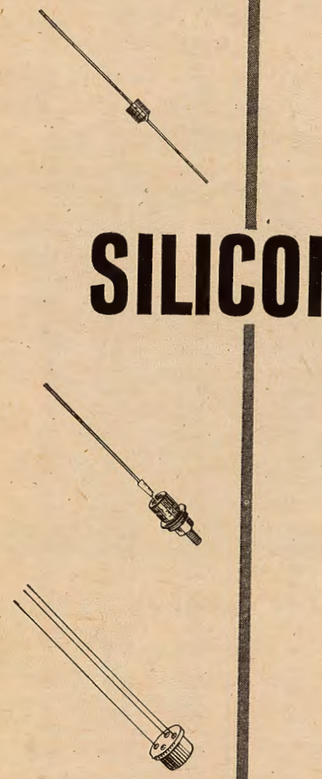
Valve	Base	Pages	Equivalents
2A7	UX7-1	13	
2B4	UX5-1	97	
2B6	UX7-4	67	
2B7	UX7-2	25	
2B25	B7G-12	88	
2C21	UX7-15	67	
2C22	IO-107	67	
2C51	B9A-4	67	
2D2	B5-3	45	
2D4A	B5-3	45	D41, DDL4, V914
2D4B	B7-21	45	
2D13C	B5-3	45	10D1
2D21	B7G-51	95	
	B7G-51	97	
2E5	UX-11	90	
2E30	UX7-5	42	
2E31	Wires	24	
2E32	Wires	24	
2E35	Wires	35	
2E36	Wires	35	
2E41	Wires	24	
2E42	Wires	24	
2G5	UX-11	90	
2G22	Wires	14	
2G101	—	58	
2G102	—	58	
2G103	—	58	
2G104	—	58	
2G110	—	58	
2G220	—	58	
2G221	—	58	
2G222	—	58	
2G223	—	58	
2G224	—	58	
2G225	—	58	
2G226	—	58	
2G227	—	58	
2G228	—	58	
2G229	—	58	
2G230	—	58	
2G231	—	58	
2G240	—	58	
2G301	—	58	
2G302	—	58	
2G303	—	58	
2G304	—	58	
2N104	—	54	
2N105	—	54	
2N109	—	54	
2N139	—	54	
2N140	—	54	
2N175	—	54	
2N176	—	54	
2N207	—	57	
2N215	—	54	
2N217	—	54	
2N218	—	54	
2N219	—	54	
2N220	—	54	
2N247	—	54	
2N269	—	54	
2N270	—	54	
2N274	—	54	
2N301	—	54	
2N301-A	—	54	
2N331	—	54	
2N351	—	54	
2N370	—	55	
2N371	—	55	
2N372	—	55	
2N373	—	55	
2N374	—	55	
2N376	—	55	
2N384	—	55	
2N398	—	55	

Valve	Base	Pages	Equivalents
2N404	—	55	
2N405	—	55	
2N406	—	55	
2N407	—	55	
2N408	—	55	
2N409	—	55	
2N410	—	55	
2N411	—	55	
2N412	—	55	
2N456	—	58	
2N457	—	58	
2N458	—	58	
2N499	—	57	
2N501	—	57	
2N501A	—	57	
2N502	—	57	
2N502A	—	57	
2N503	—	57	
2N535B	—	57	
2N536	—	57	
2N544	—	55	
2N578	—	55	
2N579	—	55	
2N580	—	55	
2N581	—	56	
2N582	—	56	
2N583	—	56	
2N584	—	56	
2N585	—	56	
2N586	—	56	
2N591	—	56	
2N597	—	57	
2N598	—	57	
2N599	—	57	
2N600	—	57	
2N601	—	57	
2N640	—	56	
2N641	—	56	
2N642	—	56	
2N643	—	56	
2N644	—	56	
2N645	—	56	
2N647	—	56	
2N649	—	56	
2N671	—	57	
2N675	—	57	
2N696	—	58	
2N697	—	58	
2N706A	—	58	
2N711	—	58	
2N715	—	58	
2N716	—	58	
2N753	—	58	
2N1010	—	56	
2N1023	—	56	
2N1066	—	56	
2N1090	—	56	
2N1091	—	56	
2N1123	—	57	
2N1158	—	57	
2N1177	—	56	
2N1178	—	56	
2N1179	—	56	
2N1180	—	56	
2N1183	—	56	
2N1183-A	—	56	
2N1183-B	—	56	
2N1184	—	56	
2N1184-A	—	56	
2N1184-B	—	56	
2N1224	—	57	
2N1225	—	57	
2N1226	—	57	
2N1300	—	57	
2N1301	—	57	
2N1395	—	57	

Valve	Base	Pages	Equivalents
2N1396	—	57	
2N1397	—	57	
2N1425	—	57	
2N1426	—	57	
2N1499A	—	57	
2N1500	—	57	
2N1727	—	57	
2N1728	—	57	
2N1742	—	57	
2N1743	—	57	
2N1744	—	57	
2N1745	—	57	
2N1747	—	57	
2N1748	—	57	
2N1749	—	57	
2N1750	—	57	
2P	B4-1	27	PA20, ACO42
2S001	—	58	
2S002	—	58	
2S003	—	58	
2S004	—	58	
2S005	—	58	
2S012A	—	59	
2S013A	—	59	
2S014	—	59	
2S017	—	59	
2S018	—	59	
2S020	—	59	
2S101	—	59	
2S109	—	59	
2S701	—	59	
2S702	—	59	
2T/270K	B7G-22	87	HR2, V1928, 6305
2V3	IO-58	88	
2W3	IO-59	76	
2X2	UX4-8	88	
2X102/G	—	47	
2X103/G	—	47	
2X104/G	—	47	
2X105/G	—	47	
2X106/G	—	47	
2XP	B4-1	27	2P, PA20, ACO42
2Y2	UX4-8	88	
2Z2	UX4-4	76	
3/1	—	99	
3/2	—	99	
3/3	—	99	
3/4	—	99	
3/5	—	99	
3/6A	—	99	
3/16	B7B-2	99	
3/18	B7B-2	99	
3/20	B4E-1	99	
3/31	B7B-2	99	
3/32	B7B-2	99	
3A/146J	—	70	
3A/147J	—	70	
3A/148J	—	70	
3A/154M	B8B-15	70	
3A/167M	B8B-56	67	
3A4	B7G-7	27, 28, 34, 70	DL93
3A5	B7G-8	67	DCC90
3B/240M	B8B-54	70	
3B/241M	B8B-54	70	
3B5	IO-87	35	
3B7	B8B-34	67	
3B24	UX4-13	76	
3B25	UX4-9	76	
3B26	IO-58	88	
3B27	UX4-4	76	



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Valve	Base	Pages	Equivalents
3B28	UX4-9	**75**	
3C4	B7G-9	**26, 29, 34, 37, 38, 41**	DL96
3C5	IO-87	**35**	
3C6	B8B-35	**67**	
3C23	UX4-20	**96**	
3C24	UX4-9	**69**	
3D6	B8B-32	**25, 26**	
3D22	B7G-73	**97**	
3D22A	UX7-16	**96**	
3E6	B8B-44	**25**	
3LE4	B8B-32	**36**	
3LF4	B8B-32	**35**	
3Q4	B7G-6	**26, 32, 34, 36**	N18, DL95
3Q5	IO-87	**26, 29, 33, 34, 35**	N15, N16, DL33
3S002	—	**59**	
3S004	—	**59**	
3S4	B7G-6	**26, 28, 29, 34, 36, 41**	N17, DL92, 1P10
3S4/DL92	B7G-6	**38**	N17, DL92, 1P10, 3S4
3SB6	IO-78	**25**	
3V4	B7G-9	**26, 28, 35, 37, 38**	1P11, DL96, N19
3V4/DL94	B7G-9	**29**	3V4, N19, 1P11, DL94
4/13	B7B-1	**99**	
4/14T	B7B-1	**99**	
4/14TG	B7B-1	**99**	
4/15T	B7B-1	**99**	
4/15TG	B7B-1	**99**	
4/100BU	B4-5	**71**	
4A6	IO-95	**42, 67**	
4A88	—	**80**	
4C1017	—	**80**	
4D1	B7-23	**59**	DA, HL1320, HL13C
4D32	B7A	**69**	
4D958	—	**80**	
4THA	B7-3	**7**	AC/TH1, TH4A, TH4B
4TPB	B7-6	**16**	
4TSA	B7-38	**16**	
4TSB	B7-5	**16**	
4XP	B4-1	**27**	LP4, PX4, PP3/250, ACO44, P12/250
5/2	B7B-3	**99**	
5/2T	B7B-3	**99**	
5/3	B7B-3	**99**	
5/3T	B7B-3	**99**	
5A/102D	IO-8	**23**	
5A/152M	B8G-3	**23**	
5A/162D	IO-8	**23**	
5A/163K	B9A-60	**23**	
5A/170K	B9A-45	**23**	
5A/180M	B8G-19	**23**	
5AZ4	IO-60	**76**	
5B/110M	B8G-3	**23**	
5B/254M	B8B-66	**41, 70**	
5B/255M	B8B-65	**41, 70**	
5B/256M	B8B-65	**70**	
5B/257M	B8B-65	**70**	
5D1	—	**80**	
5R4	IO-60	**71, 72**	
5T4	IO-60	**76**	5U4
5U4	IO-60	**71, 72, 74, 75**	U52, 53KU, 5T4
5V4	IO-62	**71, 72, 74, 75, 76**	54KU, GZ32
5W4	IO-60	**76**	
5X3	UX4-3	**88**	
5X4	IO-61	**75**	R52
5Y3	IO-60	**71, 72, 74, 75**	U50
5Y4	IO-61	**76**	
5Z3	UX4-3	**70, 75**	U50, 4274A
5Z4	IO-62	**71, 72, 74, 75**	R52, U50, GZ30, 52KU
6/5	—	**99**	
6/6	—	**99**	
6/7	—	**99**	
6/30L2	B9A-39	**61**	
6A3	UX4-1	**36, 37, 42**	
6A4	UX5-3	**36**	
6A5	IO-35	**36, 42**	
6A6	UX7-5	**42, 62, 67**	HLA2, 41MTL, MH4, 354V, ACHL
6A7	UX7-1	**7, 9, 12, 13**	
6A8	IO-1	**7, 9, 12, 13**	X63
6AB4	B7G-45	**67**	
6AB5	UX6-11	**90**	
6AB6	IO-23	**36**	
6AB7	IO-10	**18, 25**	
6AB8	B9A-13	**26, 27, 29, 35, 60, 61, 66**	LN152, ECL80
6AC5	IO-20	**36, 42**	
6AC6	IO-23	**36**	
6AC7	IO-10	**18, 24, 25**	
6AD5	IO-20	**67**	
6AD6	IO-46	**90**	
6AD7	IO-42	**36**	
6AE5	IO-20	**67**	
6AE6	IO-23	**67**	
6AE7	IO-24	**67**	
6AF4A	B7G-60	**60**	
6AF5	IO-20	**67**	
6AF6	IO-100	**90**	
6AF7	IO-48	**90**	
6AG5	B7G-14	**19, 25**	
6AG6	IO-36	**26**	N147, EL33, 6M6
6AG7	IO-11	**36**	
6AH5	IO-104	**36**	
6AH6	B7G-16	**67**	
6AH7	IO-27	**67**	
6AJ5	B7G-14	**25**	
6AJ7	IO-10	**25**	
6AJ8	B9A-24	**13**	ECH81, X719
6AK5	B7G-14	**15, 24**	EF95
6AK5/EF95	B7G-14	**19**	
6AK6	B7G-16	**26, 37**	
6AK7	IO-10	**25**	
6AK8	B9A-2	**60, 61, 66**	EABC80, 6T8, DH719
6AL5	B7G-18	**44, 45**	DD6, D77, D152, 6D2, EB91, DD6G
6AL5/EB91	B7G-18	**44**	
6AL6	IO-38	**36**	
6AL7	IO-101	**90**	
6AM4	B9A-38	**60**	
6AM5	B7G-25	**16, 26, 28, 35, 37, 38, 41**	N77, EL91, N144, 7D9
6AM5/EL91	B7G-25	**29**	
6AM6	B7G-21	**15, 18, 24**	8D3, EF91, Z77, 6F12, SP6
6AM6/EF91	B7G-21	**18**	
6AN5	B7G-14	**36**	
6AN6	B7G-38	**45**	
6AQ5	B7G-27	**26, 28, 30, 32, 35, 37, 38, 39, 40, 41**	EL90
6AQ5/EL90	B7G-27	**29**	
6AQ6	B7G-19	**67**	
6AQ7	IO-32	**67**	
6AQ8	B9A-39	**61**	see ECC85
6AR5	B7G-41	**36**	
6AR6	IO-37	**36**	
6AR7	IO-33	**67**	
6AS5	B7G-42	**36**	
6AS6	B7G-32	**16, 22, 25**	
6AS7	IO-26	**36**	A1834
6AT6	B7G-19	**60, 62, 64, 66**	DH77, EBC90
6AU5	IO-140	**36**	
6AU6	B7G-16	**15, 24**	EF94
6AV6	B7G-19	**59, 66**	
6AX5	IO-54	**76**	
6B4	IO-81	**26, 36, 37**	6A3
6B5	UX6-5	**36**	
6B6	IO-29	**67**	
6B7	UX7-2	**24**	
6B8	IO-15	**15, 18, 24**	
6BA6	B7G-16	**15, 18, 19, 21, 24**	W727, EF93
6BA7	B9A-3	**14**	
6BD6	B7G-16	**25**	
6BE6	B7G-29	**7, 9, 11**	X77, X727, EK90
6BE6/EK90	B7G-29	**9, 13**	X727, EK90
6BF6	B7G-19	**67**	
6BG6	IO-39	**42**	
6BH6	B7G-32	**15**	
6BJ6	B7G-32	**15, 21**	
6BK4	IO-130	**90**	
6BM8	B9A-37	**26, 37**	see ECL82
6BN5	B9A-26	**29**	see EL85
6BQ5	B9A-16	**26, 27, 29, 35, 37, 38, 39, 41**	N709, EL84
6BQ7A	B9A-39	**60**	
6BR5	B9A-41	**89**	see EM80
6BR7	B9A-35	**15**	8D5
6BR8	B9A-67	**15, 60**	
6BS7	B9A-20	**15**	
6BT4	B8A-14	**75**	EZ40, UU9, 66KU, U150
6BW6	B9A-19	**26, 37**	
6BW7	B9A-10	**15**	6BX6, EF80, Z719, Z152
6BX6	B9A-10	**15, 19, 24**	see EF80, 6BW7, Z719, Z152
6BY7	B9A-10	**19, 24**	EF85, W719
6C4	B7G-15	**27, 29, 31, 35, 60, 68**	L77, EC90

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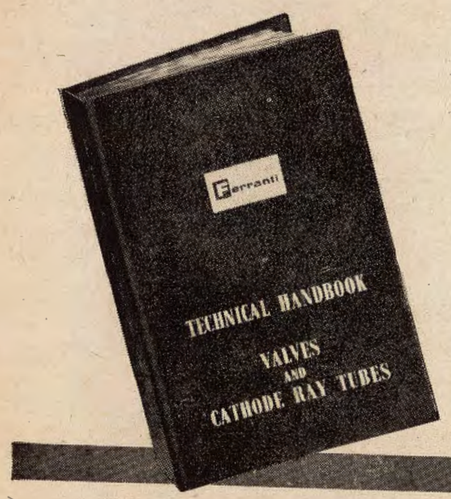

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Valve	Base	Pages	Equivalents
6C5	IO-20	59, 60, 62, 65, 66	6J5, L63
6C6	UX6-2	15, 18, 23	
6C7	UX7-9	67	
6C8	IO-28	67	
6C9	B8A-3	8	
6C10	B8A-3	8	62TH, X150, ECH42
6C12	B9A-24	9	
6C31	IO-3	8	6K8, OM10, X65, ECH35
6CB6	B7G-32	16, 25	
6CD6	IO-39	26, 37, 42	
6CH6	B9A-19	16, 26, 37	EL821, 7D10
6CJ5	B8A-7	18, 24	EF41, 6F15
6CJ6	B9A-17	43	
6CK5	B8A-23	35, 38, 41	EL41
6CK5	B8A-23	29	see EL41
6CQ6	B7G-21	24	
6CT7	B8A-12	18, 24	see EAF42
6CU7	B8A-3	13	ECH42
6CV7	B8A-9	66	EBC41
6CW7	B9A-28	60	see ECC84
6D1	B3G-1	44	EA50, SD61
6D2	B7G-18	44	D77, DD6, D152, EB91, 6AL5, DD6G
6D3	B7G-50	44	
6D4	B7G-24	96	
6D6	UX6-2	15, 18, 23	
6D7	UX7-11	25	
6D8	IO-1	14	
6DA6	B9A-36	15, 19	see EF89
6E5	UX6-11	90	
6E6	UX7-5	42	
6E7	UX7-11	25	
6E8	IO-1	13	
6EH6	B7G-32	25	
6EH7	B9A-10	24	
6F1	B8A-17	17, 61	
6F4	—	67	
6F5	IO-18	67	
6F6	IO-36	26, 29, 33, 35, 37, 38, 40, 41	KT63
6F7	UX7-13	7, 14	
6F8	IO-28	62, 67	
6F11	B8A-8	17, 61	
6F12	B7G-21	17, 61	Z77, 8D3, 6AM6, EF91, SP6
6F13	B8A-8	17, 61	
6F14	B8A-8	17	
6F15	B8A-8	17	EF41, W150, 6CJ5, 62VP
6F16	B8A-18	17	
6F18	B9A-10	17	
6F19	B9A-10	17	
6F20	B9A-10	18	
6F21	B7G-21	18	
6F22	B9A-23	18	
6F23	B9A-10	18, 61	
6F24	B9A-10	18, 61	
6F25	B9A-10	18	
6F26	B9A-10	18	
6F32	MO-11	17	
6F33	B7G-21	16, 18	
6FD12	B9A-12	18	
6FG6	B9A-55	89	
6G5	UX6-11	88, 90	6U5, 6H5
6G5G	IO-46	89	Y63, 63ME, VFT6
6G6	IO-36	36	

Valve	Base	Pages	Equivalents
6H1	B7G-76	9	
6H4	IO-56	45	
6H5	UX6-11	90	6U5, 6G5
6H6	IO-53	44, 45	D63
6H8	IO-15	25	
6J4	B7G-30	67	
6J5	IO-20	60, 62, 65, 66	L63, 6C5
6J6	B7G-17	60, 62, 66, 67, 68, 70	ECC91
6J7	IO-8	15, 16, 18, 22, 24	KTZ63, Z63
6J8	IO-3	14	
6K4	Wires	67	
6K5	IO-19	67	
6K6	IO-36	26, 27, 29, 36, 37, 38	
6K7	IO-8	15, 16, 18, 22	KTW63, W63
6K8	IO-4	7, 9, 12, 13	X65, X61M, X147
6K25	IO-20	95	
6L1	B8A-13	61	
6L4	—	67	
6L5	IO-20	67	
6L6	IO-36	26, 27, 28, 29, 32, 35, 37, 38, 40, 41	
6L7	IO-2	14	X64
6L12	B9A-39	62	
6L13	B9A-1	62	
6L18	B8A-6	61	
6L19	B8A-13	61	
6L34	B7G-24	61	
6LD3	B8A-9	61	EBC41
6LD12	B9A-2	62	6AK8, EABC80, 6T8, DH719
6LD13	B9A-54	62	
6LD20	B8A-9	61	
6M1	IO-46	88	6U5G, 63ME, VFT6, Y63
6M2	IO-135	88	
6M6	IO-36	35	EL33, 6AG6, 6P25, N147
6M7	IO-8	25	
6M8	IO-17	25	
6N4	B7G-37	67	
6N5	UX6-11	90	see 6AB5
6N6	IO-23	36	see 6B5
6N7	IO-22	26, 37, 42, 59, 62, 67	6A6
6N8	B9A-12	15, 19, 24	EBF80, WD709, ZD152
6P1	IO-36	28	
6P5	IO-20	67	
6P7	IO-76	14	see 6F7
6P8	IO-4	14	
6P12	B9A-37	28, 62	
6P15	B9A-16	28, 38	N709, EL84, 6BQ5
6P17	B7G-63	28	
6P25	IO-36	28, 38	6AG6, EL33, N147, 6M6
6P28	IO-38	43	
6Q5	IO-20	97	
6Q6	IO-30	68	
6Q7	IO-29	59, 60, 62, 65, 66	DH63, DH147
6R6	IO-12	25	
6R7	IO-29	59, 66, 68	DL63
6S2	B9A-50	87	see EY86
6S4	B9A-7	68	

Valve	Base	Pages	Equivalents
6S6	IO-13	25	
6S7	IO-8	25	
6S8	IO-34	68	
6SA7	IO-6	9, 13, 14	
6SA7GT/G	IO-7	9, 14	
6SB7Y	IO-6	14	
6SC7	IO-25	59, 68	
6SD7	IO-10	25	
6SE7	IO-10	25	
6SF5	IO-21	67	see 6F5
6SF7	IO-71	25	
6SG7	IO-14	16, 18	
6SH7	IO-14	16, 18, 25	
6SJ7	IO-10	18, 24	
6SK7	IO-10	16, 18, 22, 24	
6SL7	IO-26	59, 60, 62, 66	ECC35
6SN7	IO-26	59, 60, 62, 65, 66	ECC32
6SQ7	IO-31	62, 66	see 75
6SR7	IO-31	68	
6SS7	IO-10	16, 18	
6ST7	IO-31	68	
6SU7	IO-26	68	
6SV7	IO-71	25	
6SZ7	IO-31	68	
6T5	UX6-11	90	
6T6	IO-9	28	
6T7	IO-29	69	
6T8	B9A-2	55	EABC80, 6AK8, DH179
6TH8	IO-3	13	
6U4	IO-109	102	
6U5	UX6-11	88, 90	6G5, 6H5
6U5G	IO-46	88, 89	
6U6	IO-36	36	
6U7	IO-8	15, 18	KTW63, W63 6J7, 6K7
6U8	B9A-25	13	ECF82
6V4	B9A-31	71, 72, 75	see EZ80
6V6	IO-36	26, 27, 29, 33, 35, 37, 38, 40, 41	
6V7	IO-29	68	
6W2	Wires	86, 87	SU61, R12A, EY51, U151, U43 EY50, R12
6W4	IO-109	76	
6W5	IO-54	76	
6W6	IO-36	36	
6W7	IO-8	25	
6X2	Wires	87, 88	EY51, R12, R12A
6X4	B7G-31	71, 72, 74, 75	U78, EZ90
6X5	IO-54	71, 72, 74, 75	U70, U147, EZ35
6X6	IO-46	90	
6Y3	IO-102	88	
6Y5	UX6-12	76	
6Y6	IO-36	29	
6Y7	IO-22	42	
6Z3	UX4-3	76	
6Z4	UX5-5	75	
6Z5	UX6-13	76	
6Z7	IO-22	42	
6ZY5	IO-54	76	
7A2	B5-7	26, 37	APP4A, MPT4, MKT4/5, Pen4VA

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Valve	Base	Pages	Equivalents
(Continued)	B7-24	**26, 37**	ACPen, Pen4VA, APP4A, KT42, MPPen, MKT4/7
7A3	B7-24	**26**	MP/Pen, PT4, KT41, N41, AC2/Pen, PenA4, Pen4VB, 420T, APP4B
7A4	B8B-15	**68**	
7A5	B8B-10	**36**	
7A6	B8B-11	**45**	
7A7	B8B-3	**25**	
7A8	B8B-9	**14**	
7AB7	B8B-46	**25**	
7AC7	B7G-16	**25, 67**	see 6AH6
7AD7	B8B-3	**25**	
7AF7	B8B-14	**68**	
7AG7	B8B-3	**25**	
7AH7	B8B-3	**25**	
7AN7	B9A-28	**60, 61, 62, 67**	PCC84, 30L1, B319
7B4	B8B-15	**67**	see 6F5
7B5	B8B-10	**36**	
7B6	B8B-2	**59, 68**	DH81
7B7	B8B-3	**15, 16, 18, 21**	W149, EF22
7B8	B8B-9	**14**	
7C4	B8B-23	**45**	
7C5	B8B-10	**26, 27, 28, 29, 32, 37, 38**	N148
7C6	B8B-2	**59, 60, 62, 64**	DH149
7C7	B8B-3	**25**	
7D3	B7-24	**26**	40PPA
7D5	B7-24	**26, 37**	N30, PP13A, KT30, PTA
7D6	B7-24	**26**	Pen 3520, Pen 36C, PP35, Pen 383
7D7	B8B-8	**14**	
7D8	B7-24	**26**	PTA, Pen 1340, Pen 13C
7D9	B7G-25	**26**	see 6AM5
7D10	—	**16, 26, 37**	see 6CH6
7E5	B8B	**68**	
7E6	B8B-12	**68**	see 6R7
7E7	B8B-13	**25**	
7F7	B8B-14	**68**	
7F8	B8B-20	**68**	
7FC7	B9A-28	**67**	
7G7	B8B-3	**25**	
7G8	B8B-18	**25**	
7H7	B8B-13	**15, 18, 21**	W148, W81
7HG8	B9A-64	**14**	PCF86
7J7	B8B-8	**14**	
7K7	B8B-21	**59, 62**	
7L7	B8B-3	**25**	
7R7	B8B-13	**15, 18**	
7S7	B8B-8	**7, 8, 9**	X148, X81, 7J7
7T7	B8B-3	**25**	
7V7	B8B-3	**25**	
7W7	B8B-19	**25**	
7X7	B8B-22	**68**	
7Y4	B8B-1	**71, 72, 74**	U149, U82
7Z4	B8B-1	**70, 72**	U82

Valve	Base	Pages	Equivalents
8A1	B5-2 / B7-5	**15**	MSP4/5 or MSP4/7, A50A, SPT4A, MS/Pen, AC/SG, SP4
8D2	B7-6	**15**	13SPA, SP13C, SP1320, SPTA
8D3	B7G-21	**15**	see 6AM6, EF91, Z77, 6F12, SP6
8D5	B9A-35	**15**	see 6BR7
8D8	B9A-23	**15**	
9A1	B5-2 / B7-5	**15**	MVS/Pen, VPTA, VMP4, AC/SGVM AC/VP1, VP4, VP4A, VPT4
9A8	B9A-25	**14**	LZ319, 30C1, PCF80, 8A8
9A8/ PCF80	B9A-25	**9**	
9AQ8	B9A-39	**62**	see PCC85
9BW6	B9A-19	**26, 37**	
9D2	B7-6	**15**	13VPA, VP1322, VP13C
9D6	B7G-21	**15, 21**	W77, EF92, VP6, 6CQ5
9D7	B9A-10	**15**	
9U8	B9A-25	**14**	PCF82
9U8/ PCF82	B9A-25	**9**	
10C1	B8A-3	**9**	X145
10C2	B8A-19	**9**	
10C14	B9A-24	**9**	
10D1	B5-3	**44**	ZD, 2D13C, DD13, C20C
10D2	B7G-18	**44**	
10F1	B8A-17	**17**	
10F3	B8A-8	**17**	
10F9	B8A-8	**17**	W125, UF41
10F18	B9A-10	**18**	
10FD12	B9A-12	**18**	
10L1	B7G-24	**61**	
10L14	B9A-39	**62**	
10LD3	B8A-9	**61**	DH142, UBC41
10LD11	B8A-9	**61**	DL145
10LD12	B9A-2	**62**	
10LD13	B9A-54	**62**	
10M1	IO-46	**88**	
10M2	IO-136	**88**	
10P13	B8A-7	**28, 38**	
10P14	IO-36	**28, 38**	
10P18	B9A-16	**29**	
10PL12	B9A-37	**29, 62**	UCL 82, LN 119

Valve	Base	Pages	Equivalents
11A1	B9A-62	**28**	
11A2	B7-7	**59**	DDT, MHD4, H4D
11D3	B7-7	**59**	13DHA, HAD, HLDD1320, TDD13C, 202DD
11D5	B7-7	**59**	
11E1	MO-20	**38**	
11E13	B9A-29	**69**	
11Z4	IO-55	**76**	
12A5	UX7-7	**36**	
12A6	IO-36	**26, 29, 35**	
12A7	UX7-3	**36**	
12A8	IO-1	**14**	
12AC5	B8A-7	**24**	UF41
12AC6	B7G-16	**15**	
12AD6	B7G-29	**7**	
12AE6	B7G-19	**60**	
12AH7	IO-27	**68**	
12AH8	B9A-9	**7**	
12AL5	B7G-18	**45**	
12AT6	B7G-19	**60, 64, 67**	HBC90
12AT7	B9A-1	**60, 66**	B152, B309, ECC81
12AT7/ ECC81	B9A-1	**62**	12AT7, B152, B309, ECC81
12AU6	B7G-16	**15**	
12AU7	B9A-1	**60, 63, 64, 66**	B329, ECC82
12AU7/ ECC82	B9A-1	**62**	B329, ECC82, 12AU7
12AV6	B7G-19	**60, 67**	
12AW6	B7G-14	**25**	
12AW7	B7G-32	**25**	
12AX7	B9A-1	**60, 63, 66**	B339, ECC83
12AX7/ ECC83	B9A-1	**62**	12AX7, ECC83, B339
12AY7	B9A-1	**68**	
12B6	IO-30	**68**	
12B7	B8B-3	**25**	
12B8	IO-16	**25**	
12BA6	B7G-16	**16, 24**	HF93
12BA7	B9A-3	**14**	
12BD6	B7G-16	**25**	
12BE6	B7G-29	**7, 14**	HK90
12BF6	B7G-19	**68**	
12BH7	B9A-1	**60, 61**	
12BL6	B7G-16	**16**	
12C8	IO-15	**15, 18**	
12E1	IO-38	**28**	
12E5	IO-20	**68**	
12E13	IO-36	**38**	
12F5	IO-18	**68**	
12G7	IO-29	**68**	
12H6	IO-53	**44**	
12J5	IO-20	**67**	
12J7	IO-8	**15, 18, 22, 24**	
12K5	B7G-69	**26**	
12K7	IO-8	**15, 18, 22, 24**	KTW74M, W76
12K8	IO-4	**7, 9, 12, 14**	X71M, X76M
12L8	IO-41	**36**	
12Q7	IO-29	**59, 62, 65**	DH76
12S7	B8A-12	**24**	
12S8	IO-34	**68**	
12SA7	IO-6	**14**	

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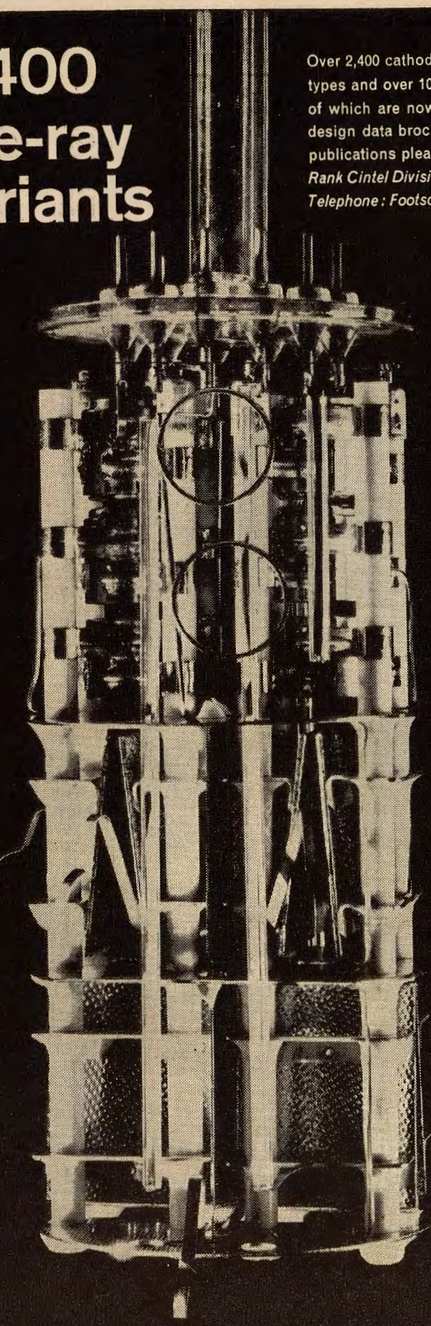

RankCintel electronic tubes

Valve	Base	Pages	Equivalents
12SC7	IO-25	60, 62, 68	
12SF5	IO-21	68	
12SF7	IO-71	25	
12SG7	IO-14	16	
12SH7	IO-14	25	
12SJ7	IO-10	18, 24	
12SK7	IO-10	18, 22, 24	
12SL7	IO-26	59, 62	
12SN7	IO-26	65, 67	B36
12SQ7	IO-31	62, 67	
12SR7	IO-31	60, 68	
12SW7	IO-31	68	
12SX7	IO-26	68	
12SY7	IO-6	14	
12U5	IO-46	88	
12XP4	B12A-9	99	C12FM, 121K, MW31-16
12XP4A	B12A-9	99	MW31-74, C12FM, 121K, MW31-16
12Y4	B8B-1	76	
12Z3	UX4-5	76	
12Z5	UX7-10	76	
13D1/ 25SN7	IO-26	59	
13D2	IO-26	59	see 6SN7
13D3	B9A-1	37, 60	
13DHA	B7-7	60	11D3, HAD, HLD1320, TDD13C
13E1	B7A-2	29	
13H18XF	—	77	
13H21SF	—	77	
13PGA	B7-2	7	15D1, VHTA
13SPA	B7-6	16	8D2, SP13C, SPTA
13VA	B7-6	16	GD2, VP13C, VP1322
14A4	B8B-15	68	
14A5	B8B-10	36	
14A7	B8B-3	25	see 12B7
14A86	—	80	
14A97	—	80	
14A100	—	80	
14A124	—	80	
14A144	—	80	
14A163	—	80	
14A342	—	80	
14A949	—	80	
14A975	—	80	
14AF7	B8B-14	68	
14B6	B8B-2	59, 68	
14B8	B8B-9	14	see 7B8
14B35	—	80	
14B130	—	80	
14B261	—	80	
14B980	—	80	
14B986	—	80	
14C5	B8B-10	36	
14C7	B8B-3	25	
14D19	—	103	
14D24	—	103	
14D28	—	103	
14D36	—	103	
14D134	—	103	
14D148	—	103	
14E6	B8B-12	68	
14E7	B8B-13	25	
14F7	B8B-14	68	
14F8	B8B-20	68	
14H7	B8B-3	15	
14J7	B8B-8	14	see 7J7
14K7	B8A-3	14	UCH42
14KP4A	B12A-9	99	141K, MW36-24
14L7	B8A-9	67	UBC41
14LP4	B12A-9	99	
14R7	B8B-13	15	
14RA 1-2-8-2	—	79	
14RA 1-2-8-3	—	79	
14RA 2-1-16-1	—	79	
14S7	B8B-8	7, 8, 9	
14V7	B8B-3	25	
14W7	B8B-19	25	
14Z3	UX4-5	76	
15A2	B7-2	7	41MPG, VHT4, MX40, X42, A80A, FC4
15A6	B9A-14	35	PL83
15B35	—	80	
15B39	—	80	
15C997	—	80	
15D1	B7-2	7	13PGA, VHTA
15D2	B7-2	7	
15D19	—	80	
15D39	—	80	
15EP4	B12A-9	99	
16A5	B9A-16	27, 35, 39, 41	PL82, N329, N154
16A8	B9A-37	29, 35	see PCL82
16HT12 to 16HT258	—	80	
16K1 to 16K16	—	79	
16MB1 to 16MB16	—	80	
16RC 1-1-16-1	—	80	
16RD 2-2-8-1	—	80	
17ASP4	B19A-9	99	171K
17AXP4	B12A-9	99	C17/1, 171K, MW43-64, TR17/21
17Z3	B9A-34	102, 103	U153, PY81, U329, U251
18	UX6-8	26, 35, 37	
18RA 1-18-1	—	80	
18RA 1-1-8-2	—	80	
18RA 1-1-16-1	—	80	
18RA 1-2-8-1	—	80	
18RA 2N-1-8-1	—	80	
18RD 2N-1-16-1	—	80	
18RD 2-2-8-1	—	80	
19	UX6-7	36	
19AQ5	B7G-27	26, 37	
19BG6	IO-39	42	
19G3	IO-119	86	
19G6	B7G-22	86	
19H1	B4-6	72	
19H4	IO-58	86	
19H5	G.E.S.	72	
19J6	B7G-17	68	
19T8	B9A-2	59, 68	HABC90
19X3	B9A-18	75, 102	PY80
19Y3	B9A-18	71, 73. 76	see PY82
20A1	B7-3	7	X41, TH4A
20A2	IO-118	95	
20A3	B7G-46	95	
20D1	B7G-18	44	
20D2	B7-3	7	X31
20D4	B9A-52	7	
20F2	B8A-8	17	
20J8	IO-2	14	
20L1	B8A-13	61	
20P1	IO-38	43	
20P3	IO-36	28, 38	
20P4	IO-38	43	
20P5	B8A-7	28	
21A1	IO-126	95	
21A6	B9A-17	14, 39, 42, 43	PL81, N339, N359 N152
24A/24E	UX4-2	15	
25A6	IO-36	26, 33, 35	
25A7	IO-99	36	
25AC5	IO-20	36	
25B5	UX6-5	36	
25B6	IO-36	36	
25B8	IO-16	25	
25C6	IO-36	36	
25D8	IO-17	25	
25L6	IO-36	26, 29, 33, 35	
25N6	IO-23	36	see 25B5
25RE	UX6-9	71	
25SN7	IO-26	60, 66	see 13D1
25U4	IO-109	102	
25W4	IO-109	76	
25X6	IO-53	76	
25Y4	IO-55	76	
25Y5	UX6-9	71, 75	
25Z3	UX4-5	76	
25Z4	IO-111	71, 74, 76	
25Z5	UX6-9	76	
25Z6	IO-53	76	
26A6	B7G-16	25	
26A7	IO-41	36	
26C6	B7G-19	68	25L6
26D6	B7G-29	14	
27	UX5-1	59	
27SU	IO-106	71, 72	
28D7	B8B-38	36	
28Z5	B8B-1	76	
30	UX4-1	59	
30C1	B9A-25	9	LZ319, PCF80
30C15	B9A-42	9	
30C17	B9A-42	9	
30F5	B9A-10	18, 62	
30F27	B9A-61	17	
30FL1	B9A-49	18, 62	
30L1	B9A-28	62	B319, PCC84, 7AN7
30L15	B9A-28	62	
30P4	IO-129	43	
30P12	B9A-16	28	
30P16	B9A-16	29, 38	

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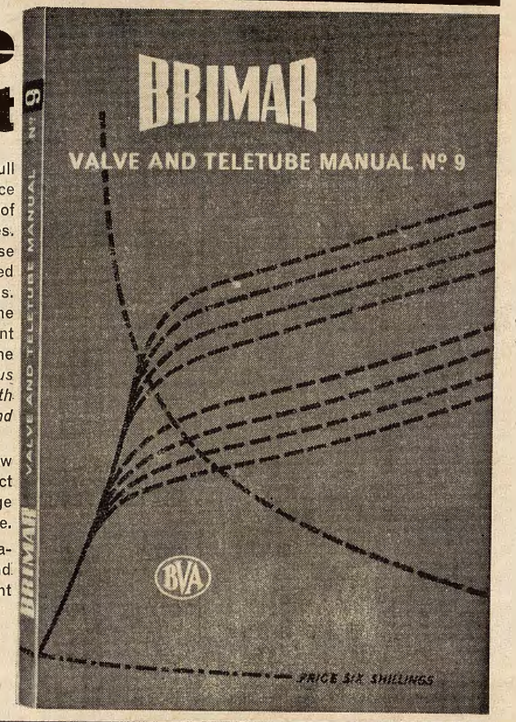

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Valve	Base	Pages	Equivalents
30P18	B9A-16	**29**	
30P19	IO-129	**43**	
30PL1	B9A-27	**29, 62**	
30PL12	B9A-37	**29, 38, 62**	
30PL13	B9A-37	**29, 62**	
30PL14	B9A-37	**29, 62**	
31A3	B8A-1	**76**	UY41, U142
32L7	IO-99	**36**	
33A/158M	B8B-14	**70**	
33B/152M	B9G-10	**70**	
35A5	B8B-10	**26, 27, 28**	
35B5	B7G-27	**36**	
35C5	B7G-42	**36**	
35L6	IO-36	**26, 29, 33, 35**	
35RE	UX6-9	**71**	
35W4	B7G-33	**71, 74, 76**	HY90
35Y4	IO-50	**76**	
35Z3	B8B-16	**71, 72**	
35Z4	IO-55	**71, 72, 76**	U74, U76
35Z5	IO-51	**72, 74, 76**	
35Z6	IO-53	**76**	
36	UX5-2	**15**	
36EHT10 to 36EHT240	—	**80**	
36EHT20 to 36EHT240	—	**88**	
36K1 to 36K14	—	**80**	
36MB1 to 36MB13	—	**80**	
37	UX5-1	**59**	
39/44	UX5-2	**15**	
39E10 to 39E60	—	**80**	
39E20 to 39E60	—	**88**	
39K1 to 39K13	—	**80**	
39K1	—	**48**	
39K2	—	**48**	
39MA1	—	**48**	
39MA2	—	**48**	
39MA3	—	**48**	
39MA4	—	**48**	
40PPA	B7-24	**27**	7D3
40SUA	B5-8	**71**	RZ, U4020, UR1C
40Z5	IO-51	**76**	
41/41E	UX6-8	**26, 36**	
41FP	B5-1	**60**	ML4
41MH	B5-1	**60**	
41MHL	B5-1	**60**	MH4, 354V, HLA2, ACHL
41MP	B5-1	**27**	ML4, L4
41MPG	B7-2	**7**	15A2, MX40, VHT4,FC4, MH4105, X42
41MPT	B7-5	**16, 42**	
41MTA	B5-1	**60**	
41MTB	B5-1	**60**	
41MTL	B5-1	**60**	V312, D4
41MTS	B7-20	**16**	
41MXP	B5-1	**27**	O54V, PA1, AC/P1
41STH	B7-3	**8**	X41, TH4, 20A1, AC/TH1
42MP/Pen	B7-24	**27**	7A3, AC/2 Pen, KT41, N41, PT4
42MPT	B7-5	**16, 42**	
42OT	B7-24	**27**	KT41, Pen A4, 7A3, APP4B, PT4, AC/2 Pen, N41
42OTD	B7-9	**27**	DN41, PT4D, AC/2 PenDD, DDPP4B
42PTB	B7-6	**16**	
42SPT	B7-5	**16**	
42	UX6-8	**26, 33, 35, 37, 38**	
43	UX6-8	**26, 33**	
44A/160M	B9G-5	**70**	
45	UX4-1	**26**	
45A5	B8A-7	**35, 41**	UL41
45Z3	B7G-20	**76**	
45Z5	IO-51	**76**	
46H1 to 46H33	—	**78**	
47/47E	UX5-3	**26**	
48H1 to 48H33	—	**78**	
50A5	B8B-10	**26**	
50B5	B7G-27	**36**	
50C5	B7G-42	**26, 35, 37**	
50C6	IO-36	**36**	
50CD6	IO-39	**26, 37, 42**	
50L6	IO-36	**26, 29, 33, 35**	KT71
50X6	B8B-11	**76**	
50Y6	IO-53	**75**	
50Y7	B8B-49	**76**	
50Z6	IO-53	**76**	
50Z7	IO-52	**76**	
52KU	IO-62	**71, 72**	R52, 5Z4, GZ30
53KU	IO-62	**71, 72**	GZ33
54KU	IO-62	**71**	
55A/165M	B8B-38	**70**	
61BT	IO-38	**42**	
61SPT	IO-49	**16**	
62BT	IO-38	**42**	
62DDT	B8A-9	**61**	see EBC41
62TH	B8A-3	**8**	see ECH42
62VP	B8A-7	**16**	see EF41
63ME	IO-46	**88**	Y63, VFT6, 6M1,6U5G
63SPT	B9G-1	**16**	see EF50
64ME	IO-48	**88**	EM34
65K/2	B4E-1	**98**	
65ME	B9A-41	**88**	EM80
66KU	B8A-14	**71**	see EZ40
67PT	B8A-23	**27**	see EL41
70A7	IO-105	**36**	
70L7	IO-43	**36**	
75	UX6-4	**59, 65, 66**	
75B1	B7G-40	**92**	
75C1	B7G-55	**92**	
75K	B4E-1	**98**	
76	UX5-1	**59**	
77	UX6-2	**15, 24**	
78	UX6-2	**15, 22, 24**	
79	UX6-6	**37**	
80	UX4-3	**71, 72, 74, 75**	
80S	UX4-21	**70**	
83	UX4-3	**70**	
83A1	B7G-55	**92**	
83V	UX4-22	**70**	
84	UX5-5	**75**	see 6Z4
85	UX6-4	**59**	
85A1	B8B-41	**92**	
85A2	B7G-28	**90, 92**	
85A3	Wires	**92**	see M8190
85K	B4E-1	**98, 99**	
90C1	B7G-28	**92**	
95A1	B7G-40	**92**	
101	IO-75	**90**	
108C1	B7G-28	**92**	M8223
108K	B4E-1	**98, 99**	
117DDP	B9A-12	**17**	see UBF80
117L7	IO-44	**36**	
117M7	IO-44	**36**	
117N7	IO-45	**36**	
117P7	IO-45	**36**	
117Z3	B7G-35	**76**	
117Z6	IO-53	**76**	
121K	B12A-1	**98**	
121VP	B8A-7	**17**	see UF41
141K	B12A-1	**98**	C36-24, MW36-24, TR14/21
141TH	B8A-3	**8**	see UCH42
142BT	IO-36	**27**	
150B2	B7G-55	**92**	
150B3	B7G-40	**90, 92**	
150C2	B7G-28	**92**	
150C4	B7G-28	**90, 92**	M8223
161	Edison Screw	**90**	
164V	B5-1	**65**	
171DDP	B9A-12	**17**	see UBF80
171K	B12A-1	**98**	C17/1, 17AXP4, MW43-64, TR17/21
172K	B12A-10	**98**	
185BT	IO-38	**43**	
185BTA	IO-38	**42, 43**	
202DDT	B7-7	**60**	
202MPG	B7-2	**7**	
202STH	B7-3	**8**	TH21C, TH2321
202VP	B7-5	**16**	
202VPB	B7-6	**16**	
203THA	B7-3	**7**	
210DDT	B5-5	**60**	MD24, TDD2A, HZD, HL21DD
210DET	B4-1	**60**	HL2
210HF	B4-1	**60**	PM1HF, HLB1, HL2
210HL	B4-1	**60**	HL2
210LF	B4-1	**60**	PM1LF, L2, L21
210PG	B7-1	**7**	X22, FC2, VHT2A
210RC	B4-1	**60**	HL2
210SPG	B7-1	**7**	VHT2A

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210SPT	B7-4	16	Z22, SP2, SPT2, SP210
210VPA	B7-4	16	W21
210VPT	B7-4	16	W21/7, VP2, VPT2, VP21, VP210
215P	B4-1	27	P215
215SG	B4-2	16	Z21, PM12, S2, S23, SG215
220B	B7-10	37	
220DD	B5-3	44	
220HPT	B5-6	27	KT2, PT2
220OT	B5-6	27	KT2, PM22A, Pen B1, PT2, Pen 220
220P	B4-1	27	LP2, PM2, P2
220PA	B4-1	27	LP2, PM2A, PB1, P220, L2
220PT	B5-6	27	PM22C, Pen 220A
220SG	B4-2	16	Z21
220SPB	B7-6	16	
220TH	B7-34	7	X42, TH2
220VS	B4-2	16	W21/4, VS2
225DU	B7-31	71	
230PT	B5-6	27	
230XP	B4-1	27	P2, LP2
240B	B7-10	37	
240QP	B7-11	37	QP21, QP22B, QPT2, QP230
301	Edison Screw	90	
302	Edison Screw	90	
302THA	B7-3	8	TH30C
303	Edison Screw	90	
304	Edison Screw	90	
305	Edison Screw	90	
310EA1	—	46	
311SU	B8A-5	71	see UY41
322 Pen	IO-36	27	see CL33
354V	B5-1	65	MH4, 41MHL, D4
402OT	B7-15	27	
402P	B7-23	27	
402 Pen	B7-15	27	
402 PenA	B7-15	27	
405BU	B4-5	86	
431U	B4-5	71	
441U	B4-5	71	
442BU	B4-5	71	
451PT	B8A-23	27	see UL41
451U	B4-5	71	
460BU	B4-5	71	RE, U14, R3, R4A
506BU	B4-5	71	U10, DW2, R1
629	UX5-1	97	
705A	B4A-1	75	
807	UX5-6	26, 27, 28, 29, 35, 37, 38, 41, 68, 69, 70	QV05-25, 5B/250A
828	UX5-8	41	
829B	B7A-1	69	
832A	57A-1	69	
866A	UX4-9	75	
884	IO-20	97	
885	UX5-1	97	
904V	B5-1	65	MH41
1629	IO-46	88, 89, 90	
2151	UX6-8	26, 37	
2201PT	B7-26	16	
4033L	B5-1	70	
4043C	UX4-1	70	
4061A	UX7	70	
4074A	UX7-12	70	2C34, DET19, RK34
4274A	UX4-3	75	5Z3
4300A	UX4-1	70	
4313C	UX4-22	96	
4304CB	B4-16	70	TY1-50, DET-12, TSW50/A, 8019
4687	Ct8-22	92	
4687A	B4-12	92	
5636	B8D-8	23	see EF730
5644	B8D-12	92	
5651	B7G-28	91	see QS1209
5696	B7G-46	97	
5726	B7G-18	44	
5749	B7G-16	15	see 6BA6
5750	B7G-29	7	see 6BF6
5763	B9A-11	26, 37, 68	QV03-12, 6062
5840	B8D-14	23	see EF732
5899	B8D-14	23	see EF731
5902	B8D-14	33	see EL71
5965	B9A-1	59	
6021	B8D-15	65	see ECC70
6057	B9A-1	60	see 12AX7
6058	B7G-8	44	
6059	B9A-35	15	see 6BR7
6060	B9A-1	60	see 12AT7
6061	B9A-19	26	see 6BW6
6062	B9A-11	26, 68	see 5763
6063	B7G-31	71	see 6X4
6064	B7G-21	15	see 6AM6
6065	B7G-21	15	see 9D6
6066	B7G-19	60	see 6AT6
6067	B9A-1	60	see 12AU7
6132	B9A-19	26	see 6CH6
6146	IO-134	68	
6157	B9A-30	70	see R17
6158	B9A-1	60	see 13D3
6267	B9A-23	24	
6351	B9A-46	21	see Z319
6443	B9A-30	71	see R18
6501	IO-112	100	
6502	IO-112	100	
6503	IO-112	100	
6504	IO-112	100	
6504A	IO-112	100	
6505	IO-112	100	
6505A	IO-112	100	
6506A	IO-112	100	
6703A	IO-112	100	
6704A	IO-112	100	
6705A	IO-112	100	
6706A	IO-112	100	
6801A	IO-112	100	
6802A	IO-112	100	
6870	B9A-44	15, 68	
6901A	B12A-5	100	
7032	B7G-29	15	
7101A	IO-112	100	
7102A	IO-112	100	
7201A	B12A-5	100	
7203A	B12A-5	100	
7204A	B12A-4	100	
7205A	B12A-19	101	CME1402
7401A	B12A-5	100	
7404A	B12A-4	100	
7405A	B8H-1	101	CME1703
7406A	B8H-2	100	CME1705
7475	B4-12	92	
7502A	B12A-4	101	
7503A	B8H-1	101	CME2101
7504A	B8H4-1	101	
13201A	B4-12	92	
96497	—	78	
9749730	—	78	
A10AA	—	82	
A10BA	—	82	
A11AA	—	82	
A11BA	—	82	
A12AA	—	82	
A12BA	—	82	
A13AA	—	82	
A13BA	—	82	
A14AA	—	82	
A14BA	—	82	
A23AA	—	82	
A23BA	—	82	
A24AA	—	82	
A24BA	—	82	
A25AA	—	82	
A25BA	—	82	
A34AA	—	82	
A34BA	—	82	
A1714	B7G-81	63	
A2087	B7G-80	45	
A2134	B7G-63	30, 39	
A2244	coaxial	69	
A2272	B9G —	73	
A2521	B9A-70	63	
A2599	B9A-71	63	
A2688	B7G-24	63	
AC/2 Pen	B7-24	28	7A3, 420T, PT4, KT41, Pen A4, APP4B

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Valve	Base	Pages	Equivalents
AC/2Pen-DD	B7-9	28	420TDD, PT4D, DN41, DDPP4B
AC/4Pen	B7-24	28	Pen 4B, APP4E
AC/5Pen	B7-24	28	PT10, N41
AC/5Pen-DD	B7-9	28	
AC/6Pen	B7-36	42	
AC/DD	B5-3	44	D41
AC/ME	B7-19	88	
AC/P	B5-1	28	
AC/Pen	B7-24	28	MKT4/7, 7A2
AC/S1VM	B5-2	17	
AC/S2	B5-2	17	MS4B, SPT4A
AC/S2Pen	B7-5	17	
AC/SG	B5-2	17	
AC/SG/VM	B5-2	17	
AC/SP1	B7-5	17	
AC/SP3	B7-6	17	
AC/TH1	B7-3	8	20A1, 41STH, X41, TH4A, TH4B
AC/TH1A	MO-12	8	
AC/TP	B9-2	8	
AC/VP1	B7-5	17	9A1, MVS Pen, VPT4, VMP4G, HP4106C
AC/VP2	B7-6	17	MVS Pen B, VPT4B, W42
AC2HL	B5-1	61	MH41
ACDD	B5-3	45	D41
ACDDT	B7-7	64	
ACHL	B5-1	61, 64	MH4
ACHLDD	B7-7	61	MHD4
ACHL-DDD	B9-5	61	
ACL	B5-1	31	
ACO42	B4-1	32	
ACP1	B5-1	28	
ACP4	B5-9	61	
ACQ	B7-24	31	
ACVP	B5-2	20	VPT4B
ACVP	B7-5	20	
ACVPB	B7-6	20	
ACY	B5-7	31	
ACY	B7-24	31	MKT4
ACZ	B5-7	31	KT41
ACZ	B7-24	31	PT4
ACZDD	B7-9	31	PT4DD
AFX203	UX4-24	96	
AFX234	B7G-24	96	
AFZ11	—	51	
AN1	B5-1	96	
APP4A	B5-7	34	7A2, MKT4/5, Pen 4VA
APP4A	B7-24	34	7A2, MKT4/7, AC Pen, Pen 4VA
APP4B	B7-24	34	7A3, 42MP Pen, PT4, KT41, AC2 Pen, Pen A14
APP4E	B7-25	34	Pen B4
APP4g	B7-5	34	
APP4g*	B7-15	34	
APV4	B4-14	75	R3, 431U, R42, MU14, UU5, IW4/500
AR2	—	77	
AS4120	B5-2	23	MS4B, SPT4A
AS4125	B5-2	23	
ASZ20	—	51	
ATZ10	—	51	
AW36-20	B12A-17	101	
AW36-21	B12A-17	101	C14/3, C14PM, SE14/70
AW36-80	B12A-17	101	
AW43-80	B12A-17	98, 101	C17/5A
AW43-88	B8H-1	98, 101	C17/7A
AW43-89	B8H-2	101	
AW53-80	B12A-17	101	
AW53-88	B8H-1	98, 101	
AW53-89	B8H-2	101	
AX50	B4-5	74	
AZ31	IO-60	74, 75	
AZ31/U143	IO-60	74	
AZ41	B8A-26	75	
B10AA	—	82	
B10BA	—	82	
B11AA	—	82	
B11BA	—	82	
B12AA	—	82	
B12BA	—	82	
B13AA	—	82	
B13BA	—	82	
B14AA	—	82	
B14BA	—	82	
B18-1-1RW	—	79	
B18-14-1RW	—	79	
B23AA	—	82	
B23BA	—	82	
B24AA	—	82	
B24BA	—	82	
B25-1-1W	—	79	
B25-14-1RW	—	79	
B34-BA	—	82	
B36	IO-26	63, 64	12SN7
B45-1-1W	—	79	
B65	IO-26	63, 64	6SN7
B109	B9A-39	63	see UCC85
B230	B7-10	39	
B309	B9A-1	63, 64	see ECC81
B319	B9A-28	63, 64	see PCC84
B329	B9A-1	63, 64	see ECC82
B339	B9A-1	63, 64	see ECC83
B349	B9A-28	63	
B719	B9A-39	63, 64	see ECC85
B729	B9A-39	63	
BCZ11	—	51	
BR201	B4-13	90	
BR201S	Ct8-8	90	
BR202	B4-13	90	
BR202S	Ct8-8	90	
BR300	Edison Screw	90	
BR300C	Edison Screw	90	
BR1500	B4-13	90	
BU10	B4-13	90	
BU29/4	IO	90	
BU30/6	Edison Screw	90	
BU65/10	Edison Screw	90	
BU78/10	B4-20	90	
BU115/22	B4-20	90	
BU200/14	B4-20	90	
BU280/20	B4-13	90	
BU600/6	Edison Screw	90	
BYZ12	—	84	
BYZ13	—	84	
BZZ10	—	94	
BZZ11	—	94	
BZZ12	—	94	
BZZ13	—	94	
C2D	—	77, 79	
C2H	—	77, 79	
C2V	—	77, 79	
C3B	—	77, 79	
C3D	—	77, 79	
C3H	—	77, 79	
C3V	—	77, 79	
C9A	—	97	CRM92, CRM91
C9B	—	97	
C12/1	B12A-1	97	MW31-74
C12A	—	97	CRM121
C12B	—	97	12MW3A
C12D	—	97	12MW3
C12E	—	97	
C12FM	B12A-1	97	121K, 12XP4, MW31-16
C14/3	B12A-2	97	AW36-21, C14PM, SE14/70
C14/13A	B12A-2	98	
C14BM	B12A-5	97	
C14FM	B12A-9	97	
C14LM	B12A-11	97	
C14PM	B12A-11	97	C14/3, AW36-21, SE14/70
C15B	—	97	15MW3A
C17/1	B12A-1	97	171K, 17AXP4, MW43-64, TR17/21
C17/1A	B12A-1	97	MW43-69, TR17/22
C17/4A	B12A-1	98	MW43-80
C17/5A	B12A-2	98	AW43-80
C17/7A	B8H-1	98	AW43-88
C17AA	B8H-2	97	
C17AF	B8H-2	97	
C17BM	B12A-5	97	
C17FM	B12A-9	97	
C17JM	B124-11	97	
C17LM	B12A-11	97	
C17PM	B12A-11	97	
C17SM	B12A-11	97	
C19/7A	B8H-1	98	
C21/1A	B12A-1	98	MW53-80, TR21/22
C21/7A	B8H-1	98	MW53-88
C21AF	B8H-2	97	
C21HM	B12A-9	97	
C21NM	B12A-10	97	
C21SM	B12A-11	97	
C21TM	B12A-9	97	
C23/7A	B8H-1	98	
C23AG	B8H-2	97	
C24KM	B12A-9	97	
C27/1A	B12A-1	98	
C27/5A	B12A-2	98	

Valve	Base	Pages	Equivalents
C36/24	B12A-1	98	141K, MW36-24, TR14/21
C178A/5894	B7A-1	69	
C1134	B7A-1	69	
CB215	B7-10	41	
CB215S	Ct8-28	41	
CB220	B7-10	41	
CBL1	Ct8-13	33	
CBL31	IO-15	35	
CCH35	IO-3	12, 14	
CG1-E	—	46	
CG4-E	—	46	
CG6-E	—	46	
CG10-E	—	46	
CG12-E	—	46	
CG60H	—	46	
CG61H	—	46	
CG62H	—	46	
CG63H	—	46	
CG64H	—	46	
CL4	Ct8-4	33	
CL6	Ct-84	33, 34, 40	PP37
CL33	IO-36	33, 35	322Pen
CL33/322Pen	IO-36	27	322Pen, CL33
CME141	B12A-2	98	
CME1402	B12A-2	98	7205A
CME1702	B12A-2	98	
CME1703	B8H-1	98	7405A
CME1705	B8H-2	98	7406A
CME1706	B8H-1	98	
CME1901	B8H-1	98	
CME2101	B8H-1	98	7503A
CME2103	B8H-1	98	
CME2104	B8H-2	98	
CME2301	B8H-1	98	
CRM71	MO-24	98	MW18-2
CRM91	MO-24	98	C9A, MW22-3
CRM92	MO-24	98	C9A, MW22-3
CRM92A	MO-24	98	C9A, MW22-3
CRM93	B12A-1	98	
CRM121	MO-24	98	C12A
CRM121A	MO-24	98	C12A
CRM121B	MO-24	98	C12A
CRM122	MO-24	98	
CRM123	MO-24	98	
CRM124	B12A-1	99	
CRM141	B12A-1	98	
CRM142	B12A-1	98	
CRM143	B12A-1	98	
CRM144	B12A-1	99	
CRM151	MO-24	98	
CRM152A	B12A-5	98	
CRM152B	B12A-5	98	
CRM153	B12A-1	98	
CRM171	B12A-1	98	
CRM172	B12A-1	99	
CRM173	B12A-1	99	
CRM211	B12A-1	98	
CRM212	B12A-1	99	
CS2A	—	46	
CS3A	—	46	
CS3B	—	46	
CS4B	—	46	
CS9B	—	46	
CV2341	Coaxial	45	
CV2398	B9A-69	45	
CV4044	B9A-30	73	
CV4071	IO-103	87	
CV7013	—	85	see 1S113
CV7027	—	85	see 1S001
CV7028	—	85	see 1S003
CV7045	—	85	see 1S111
CV7046	—	85	see 1S115
CV7056	—	58	see 2S002
CV7057	—	58	see 2S003
CV7058	—	58	see 2S004
CV7059	—	58	see 2S005
CV7060	—	59	see 2S014
CV7061	—	59	see 2S012A
CV7062	—	59	see 2S017
CV7063	—	59	see 2S018
CV7064	—	59	see 2S019
CV7065	—	59	see 2S020
CV7066	—	59	see 2S013A
CV7099	—	95	see 1S7047A
CV7100	—	95	see 1S7051A
CV7101	—	95	see 1S7056A
CV7102	—	95	see 1S7062A
CV7103	—	95	see 1S0768A
CV7104	—	95	see 1S7075A
CV7105	—	95	see 1S7082A
CV7106	—	95	see 1S7150A
CY1	Ct8-5	76	
CY31	IO-55	74, 76	
CY32	IO-53	74	
D1	B3G-1	44	T4D
D3/2/1Y	—	77	
D4	B5-1	62	MH4
D15	IO-75	90	
D41	B5-3	44, 45	DDLA, SD, V914, 2D4A, DD4, ACDD
D42	B4-8	44, 45	DDL4 D400
D43	B4-1	45	
D63	IO-53	44, 45	6H6
D77	B7G-18	45	see EB91
D152	B7G-18	45	D77, DD6, EB91, 6AL5, 6D2, DD6G
D418	B4-10	45	
DA	B7-23	62	4D1, HL1320, HL13
DA1	Sm4-1	64	
DA2	Sm4-1	64	
DA3	Sm4-1	65	
DA30	B4-1	31	
DA41	UX4-20	39, 40	TZ40
DA42	4-pin	39	
DA90	B7G-13	45	
DAC1	Ct8-32	64	
DAC32	IO-91	65	1H5
DAF70	B8D-1	21	
DAF91	B7G-5	16, 18, 22	1S5, ZD17, 1FD9
DAF91/ZD17	B7G-5	21	1S5, DAF91, ZD11, 1FD9
DAF96	B7G-5	16, 22	1AH5, 1FD1, 1P1
DAF96/1AH5	B7G-5	15, 19	1FD1, 1P1, 1AH5
DAF96/ZD25	B7G-5	20	DAF96, 1AH5, 1FD1, 1P1, ZD25
DC70	B8D-7	69	
DCC90	B7G-8	65	
DD4	B5-3	44, 45	DDL4, SD, D41, V914 2D4A
DD4D	B7-21	45	
DD6	B5-3	45	
DD6	B7G-18	44	EB91, D77, 6AL5, DD6G, D152
DD6G	B7G-18	45	D77, DD6, D152, EB91, D77, 6AL5
DD13	B5-3	45	
DD41	MO-13	44	
DD101	MO-13	44	
DD207	B4-5	44	
DD465	B5-4	45	
DD620	B5-3	44	10D1,220DD, ZD
DD818	B5-4	45	
DDL4	B5-3	44	D41, V914, 2D4A
DDP4B	B7-9	34	
DDP4M	B7-22	34	
DDPP6B	B7-9	34	
DDPP39	B7-9	34	
DDPP39M	B7-22	34	
DDT	B7-7	60	11A2, H4D, MHD4, ACHLDD, TDD4
DDT2	B5-5	66	
DDT2B	B5-5	66	
DDT2BS	Ct8-28	66	
DDT4	B7-7	66	MHD4
DDT13	B7-7	64, 66	TDD13C
DDT13S	Ct8-7	66	
DET18	UX4-20	69	
DET19	UX7-12	69	4074A
DET20	IO-107	69	
DET22	Coaxial	69	
DET24	Coaxial	69	
DET28	B9G-12	69	
DF1	Ct8-26	21	
DF33	IO-77	22	1N5
DF61	B5A-3	22	
DF62	B5A-2	22	
DF64	B5A-3	22	
DF66	B5A-1	22	
DF70	B8D-6	21	
DF72	B8D-2	21	
DF73	B8D-2	22	
DF91	B7G-2	16, 18, 22	1T4, W17, 1F3
DF91/W17	B7G-2	20	DF91, 1T4, 1F3, W17
DF92	B7G-2	22	1L4, 1F2
DF96	B7G-2	16, 22	1AJ4, 1F1
DF96/1AJ4	B7G-2	15, 19	DF96, 1F1, 1AJ4
DF96/W25	B7G-64	20	1AJ4, DF96, 1F1, W25
DF97	B7G-59	12, 19, 22	
DH30	B7-7	63, 64	HSD
DH42	B7-7	62, 64	11A2, DDT, M4D, MHD4, ACHLDD, TDD4, DDT4
DH63	IO-29	63, 64	6Q7
DH76	IO-29	63, 64	12Q7
DH77	B7G-19	63	see EBC90
DH77/6AT6	B7G-19	64	DH77, 6AT6, EBC90
DH81	B8B-12	63, 64	7B6

Valve	Base	Pages	Equivalents
DH101	B8B-12	**63, 64**	
DH107	B7G-19	**63, 64**	
DH109	B9A-2	**63**	see UABC80
DH118	B8A-9	**63**	see UBC41
DH119	B9A-54	**63**	see UBC81
DH142	B8A-9	**64**	see UBC41
DH147	IO-29	**64**	see EBC33
DH149/ 7C6	B8B-2	**64**	DH149, 7C6
DH719	B9A-2	**63, 64**	see EABC80
DK1	Ct8-31	**11**	
DK32	IO-76	**12**	1A7, X14
DK40	B8A-25	**12**	
DK91	B7G-3	**8, 12**	X17, 1R5, 1C1
DK91/ X17	B7G-3	**10, 11**	1C1, X17, DK91, 1R5
DK92	B7G-54	**11, 12**	1AC6, X18, 1C2, X20
DK92/ 1AC6	B7G-54	**8**	DK92, 1AC6, X18, 1C2
DK92/ X18	B7G-54	**11**	DK92, X18, X20, 1AC6, 1C2
DK92/ X20	B7G-54	**10**	1AC6, X18, 1C2, X20, DK92
DK96	B7G-54	**8, 11, 12**	1AB6, 1C3, X25, X109
DK96/ 1AB6	B7G-54	**7**	1AB6, 1C3, X109, DK96, X25
DK96/ X25	B7G-54	**10**	1AB6, 1C3, DK96, X25, X109
DL2	Ct8-25	**32**	
DL33	IO-87	**33**	3Q5, N16
DL35	IO-78	**33**	1C5, N14
DL63	IO-29	**64**	
DL64	B5A-3	**33**	
DL66	B5A	**32**	
DL68	B5A-1	**33**	
DL69	B5A-5	**33**	
DL70	B8D-6	**33, 69**	
DL71	B8D-6	**32**	
DL72	B8D-6	**32**	
DL73	B8D-6	**33, 69**	
DL75	B8D-6	**32, 40**	
DL82	B8B-12	**63, 64**	
DL92	B7G-6	**27, 33, 38, 40**	3S4, N17, 1P10
DL92/ N17	B7G-6	**31**	DL92, N17, 3S4, 1P10
DL93	B7G-7	**33, 69**	3A4
DL94	B7G-9	**27, 29, 33, 34, 38**	3V4, N19, 1P11
DL94/ N19	B7G-58	**30, 32**	3V4, 1P11, DL94, N19
DL96	B7G-9	**33, 38, 40**	1P1, 3C4
DL96/ 3C4	B7G-9	**26, 29, 37, 38**	DL96, 3C4, 1P1
DL96	B7G-9	**27, 32**	1P1, 3C4
DL96/ N25	B7G-9	**30**	DL96, N25, 1P1, 3C4
DL145	B8A-9	**64**	
DL620	B5A-1	**33**	
DM70	B8D-9	**89**	1M1, Y25, 1M3
DM70/ 1M3	B8D-9	**89**	DM70, 1M1, 1M3, Y25
DN41	B7-9	**30, 31**	DDPP4B, PT4D
DN143	B8B-62	**32**	see EBL21
DO24	B4-1	**32**	PX25, PP5/400, P27/500, LP25
DO26	B4-1	**32**	
DO30	B4-1	**32, 40**	DA30, P30/500
DP61	B7G-14	**19**	
DRM1B	—	**77, 79**	DSM1
DRM2B	—	**77, 79**	DSM2/3
DRM3B	—	**77, 79**	DSM2/3
DSM1	—	**79**	
DSM2/3	—	**79**	
DW2	B4-5	**74**	R1, 431U, U10, UU5, PV295
DW4-350	B4-5	**74**	R3, 431U, U14, UU5, RV120/350, R4, R43
DW4-500	B4-5	**74**	R3, 431U, U14, UU5, RV120/500
DY70	Wires	**87**	
DY86	B9A-50	**86**	
E88CC	B9A-39	**60, 65**	
E90CC	B7G-17	**65**	
E180F	B9A-45	**16, 22**	
EA50	B3G-1	**45**	6D1, SD61
EA76	B5B-1	**45**	2S/104G
EAB1	Ct8-17	**45**	
EABC80	B9A-2	**62, 65**	DH719, 6T8, 6AK8, 6LD12
EABC80/ 6AK8	B9A-2	**60, 61**	EABC80, 6AK8, 6LD12, 6T8, DA719
EABC80/ DH719	B9A-2	**63, 64**	EABC80, DH719, 6T8, 6AK8, 6LD12
EAC91	B7G-23	**65, 66**	
EAF41	B8A-11	**21**	
EAF42	B8A-12	**22**	6CT7
EAF42/ 6CT7	B8A-12	**18**	
EB4	Ct8-10	**45**	
EB34	IO-53	**45**	
EB41	B8A-10	**44, 45**	
EB91	B7G-18	**44, 45**	D77, DD6, DD6G, 6AL5, D152, 6D2
EB91/ D77	B7G-18	**45**	EB91, D77, 6D2, 6AL5, DD6G, DD6
EBC3	Ct8-7	**65, 66**	
EBC33	IO-29	**65, 66**	DH147, OM4
EBC33/ DH147	IO-29	**64**	EBC33, DH147, OM4
EBC41	B8A-9	**59, 62, 65**	DH150, 6LD3, 62DDT
EBC41/ 62DDT	B8A-9	**61**	EBC41, 62DDT, DH150, DH718, 6LD3
EBC41/ DH718	B8A-9	**63**	6LD3, EBC41, DH718, DH150, 62DDT
EBC81	B9A-54	**65, 66**	6CV7
EBC90	B7G-19	**65**	DH77, 6AT6
EBC90/ DH77	B7G-19	**63**	EBC90, DH77, 6AT6
EBC91	B7G-19	**65**	
EBF2	Ct8-13	**23**	
EBF80	B9A-12	**22**	6N8, WD709, ZD152
EBF80/ 6N8	B9A-12	**15, 19**	ZD152, WD709, EBF80, 6N8
EBF80/ WD709	B9A-12	**19, 21**	6N8, EBF80, WD709, ZD152
EBF83	B9A-12	**22**	
EBF89	B9A-12	**21, 22**	
EBL1	Ct8-13	**32, 34**	
EBL21	B8B-6	**33, 40**	DN143
EBL21/ DN143	B8B-6	**32**	EBL21, DN143
EBL31	IO-15	**33, 35**	
EC1	—	**80**	
EC2	—	**80**	
EC3	—	**80**	
EC4	—	**80**	
EC9	—	**80**	
EC10	—	**80**	
EC11	—	**81**	
EC12	—	**81**	
EC13	—	**81**	
EC15	—	**81**	
EC16	—	**81**	
EC18	—	**81**	
EC19	—	**81**	
EC31	IO-20	**32, 65**	
EC52	B9G-3	**65, 69**	
EC53	B3G-1	**65, 69**	
EC56	—	**70**	
EC57	—	**70**	
EC70	B8D-8	**69**	
EC71	B8D-16	**65**	
EC90	B7G-15	**65**	L77, 6C4
EC91	B7G-24	**65**	
EC92	B7G-66	**65**	
ECC32	IO-26	**65**	B65, ECC23, 6SN7
ECC33	IO-26	**65**	B65, ECC32, 6SN7
ECC34	IO-26	**65**	
ECC35	IO-26	**65**	6SL7
ECC40	B8A-13	**65**	
ECC70	B8D-15	**65**	
ECC81	B9A-1	**61, 65**	12AT7, B309
ECC81	B9A-1	**62**	see 12AT7
ECC81/ B309	B9A-1	**63, 64**	ECC81, B309, 12AT7, B152
ECC82	B9A-1	**61, 65**	B329, 12AU7
ECC82	B9A-1	**62**	see 12AU7
ECC82/ B329	B9A-1	**64**	ECC82, B329, 12AU7
ECC82/ B329/ 12AU7	B9A-1	**63**	ECC82, B329, 12AU7
ECC83	B9A-1	**61, 65**	B339, 12AX7
ECC83	B9A-1	**62**	see 12AX7
ECC83/ B339	B9A-1	**64**	ECC83, B339, 12AX7
ECC83/ B339/ 12AX7	B9A-1	**63**	ECC83, B339, 12AX7
ECC84	B9A-28	**61, 63, 65, 66**	6CW7

Valve	Base	Pages	Equivalents
ECC84/ 6CW7	B9A-28	**60**	ECC84, 6CW7
ECC85	B9A-39	**60, 66**	B719, 6AQ8
ECC85/ 6AQ8	B9A-39	**61**	
ECC85/ B719	B9A-39	**63, 64**	ECC85, B719, 6AQ8
ECC88	B9A-39	**60, 66**	
ECC91	B7G-17	**61, 66, 70**	6J6
ECF80	B9A-25	**7, 8, 10, 12, 13, 15, 60**	
ECF82	B9A-25	**12**	6U8
ECF82/ 6U8	B9A-25	**7**	6U8, ECF82
ECH2	Ct8-1	**12, 13**	
ECH3	Ct8-1	**12, 13**	
ECH21	B8B-42	**12**	X143
ECH21/ X143	B8B-42	**11**	ECH21, X143
ECH33	IO-3	**12**	
ECH35	IO-3	**12, 14**	6K8, X147, X61M, X65
ECH35/ X147	IO-3	**11**	ECH35, X147
ECH42	B8A-3	**7, 12**	62TH, X150, 6C10, 6CU7
ECH42/ 6CU7	B8A-3	**9**	6CU7, ECH42, 62TH, 6C10, X150
ECH42/ 62TH	B8A-3	**8**	62TH, X150, 6C10, 6CU7
ECH42/ X150	B8A-3	**11**	ECH42, 62TH, X150
ECH81	B9A-24	**8, 12**	X719, 6AJ8
ECH81/ 6AJ8	B9A-24	**9**	6AJ8, ECH81, X719
ECH81/ X719	B9A-24	**10, 11**	6AJ8, ECH81, X719
ECH83	B9A-24	**12**	
ECL80	B9A-13	**30, 33, 66**	LN152, 6AB8
ECL80/ 6AB8	B9A-13	**26, 27, 29, 60, 61**	ECL80, 6AB8 LN152
ECL80/ LN152	B9A-13	**32, 64**	ECL80, LN152, 6AB8
ECL82	B9A-37	**27, 29, 30, 33, 35, 66**	6BM8
ECL82/ 6BM8	B9A-37	**26, 37, 60**	ECL82, 6BM8
ECL83	B9A-27	**27, 29, 30, 33, 35, 40, 66**	
EF5	Ct8-15	**23**	
EF6	Ct8-15	**23**	
EF8	Ct8-11	**21, 23**	
EF9	Ct8-15	**22, 23**	
EF22	B8B-3	**22**	W143, 7B7
EF22/ W143	B8B-3	**21**	EF22, W143, 7B7
EF36	IO-8	**21**	OM5
EF37	IO-8	**21, 65**	
EF37A	IO-8	**22, 24, 65, 66**	OM5B
EF38	IO-66	**21**	see EF8
EF39	IO-8	**22, 24**	OM6, W147
EF39/ W147	IO-8	**21**	EF39, W147, OM6
EF40	B8A-15	**22**	
EF41	B8A-7	**15, 16, 22**	W150, 62VP, 6CJ5, 6F15
EF41/ 6CJ5	B8A-7	**18**	W150, 62VP, EF41, 6CJ5, 6F15
EF41/ W150	B8A-18	**21**	EF41, W150, 62VP, 6CJ5, 6F15
EF42	B8A-8	**18, 22**	Z150
EF42/ Z150	B8A-18	**21**	EF42, Z150
EF50	B9G-1	**16, 22, 24**	63SPT, Z90
EF54	B9G-2	**22**	
EF55	B9G-1	**22**	
EF70	B8D-3	**22**	
EF71	B8D-4	**22**	
EF72	B8D-4	**22**	
EF73	B8D-5	**22**	
EF74	B8D-5	**22**	
EF80	B9A-10	**16, 22**	6BW7, 6BX6, Z719, Z152
EF80/ 6BX6	B9A-10	**15, 19**	6BW7, 6BX6, Z719, Z152
EF80/ Z152	B9A-10	**21**	6BX6, 6BW7, EF80, Z152 Z719
EF80/ Z719	B9A-10	**21**	6BX6, 6BW7, EF80, Z719 Z152
EF85	B9A-10	**16, 22**	W719, 6BY7
EF85/ 6BY7	B9A-10	**19**	
EF85/ W719	B9A-10	**19, 21**	W719, EF85, 6BY7
EF86	B9A-23	**16, 19, 22**	Z729
EF86/ Z729	B9A-23	**19, 20, 21, 63, 64**	Z729, EF86
EF89	B9A-36	**16, 19, 21, 22, 24**	6DA6
EF91	B7G-21	**16, 22**	6AM6, 8D3, Z77, 6F12, SP6
EF91	B7G-21	**18, 24**	see 6AM6
EF91/Z77	B7G-21	**19, 21**	6AM6, EF91, Z77, SP6, 8D3, 6F12
EF92	B7G-21	**22**	W77, 9D6, VP6
EF92/ W77	B7G-21	**19**	EF92, 9D6, VP6, W77
EF93	B7G-16	**22**	W727, 6BA6
EF93/ W727/ 6BA6	B7G-16	**19**	
EF95	B7G-14	**22**	6AK5
EF97	B7G-68	**22**	
EF98	B7G-68	**22, 24**	
EF183	B9A-10	**15, 16, 22**	
EF184	B9A-10	**15, 16, 22**	
EF730	B8D-8	**23**	
EF731	B8D-14	**23**	
EF732	B8D-14	**23**	
EFM1	Ct8-18	**89**	
EH2	Ct8-16	**13**	
EK2	Ct8-2	**13**	
EK2	Ct8-2	**12**	see EK32
EK3	Ct8-2	**13**	
EK32	IO-1	**12**	
EK90	B7G-29	**12**	X727, 6BE6
EK90/ X727	B7G-29	**10**	EK90, 6BE6, X727
EL2	Ct8-33	**33, 34**	
EL3	Ct8-12	**32, 34**	
EL5	Ct8-12	**34**	
EL6	Ct8-12	**32, 34, 40**	
EL22	B8B-10	**33, 40**	
EL31	IO-40	**33, 40**	
EL32	IO-9	**33, 35, 40, 41**	OM9
EL33	IO-36	**33, 35, 40, 41**	6AG6, 6M6, 6P25, N147
EL33/ N147	IO-36	**32**	EL33, N147, 6AG6, 6M6, 6P25
EL34	IO-133	**33, 40**	
EL35	IO-36	**33, 40**	6L6
EL36	IO-36	**34, 43**	
EL36	IO-36	**32**	see EL6
EL37	IO-36	**33, 35, 40, 41**	KT66, PP60
EL38	IO-40	**27, 42, 43**	
EL41	B8A-23	**26, 33, 37, 40**	6CK5, 67PT, N150
EL41/ 6CK5	B8A-23	**29, 38**	6CK5, EL41, N150
EL41/ 67PT	B8A-23	**27**	6CK5, 67PT, EL41, N150
EL41/ N150	B8A-23	**32**	6CK5, EL41, N150, 67PT
EL42	B8A-23	**27, 29, 33, 34, 38, 40, 41**	N151
EL42/ N151	B8A-23	**32**	EL42, N151
EL50	Ct8-21	**33, 40**	
EL71	B8D-14	**33**	
EL81	B9A-17	**27, 42, 43**	
EL83	B9A-14	**33**	
EL84	B9A-16	**33, 41**	N709, 6BQ5, 6P15
EL84/ 6BQ5	B9A-16	**26, 27, 29, 37, 38, 39**	EL84, 6BQ5, N709, 6P15
EL84/ N709	B9A-16	**30, 32, 39, 40**	EL84, N709, 6BQ5, 6P15
EL85	B9A-26	**33, 35, 41, 70**	6BN5
EL85/ 6BN5	B9A-26	**29**	EL85, 6BN5
EL86	B9A-16	**27, 33**	
EL90	B7G-27	**29, 33, 41**	N727, 6AQ5
EL90/ 6AQ5	B7G-27	**38**	EL90, 6AQ5, N727
EL90/ N727	B7G-27	**30, 39**	EL90, N727, 6AQ5
EL91	B7G-25	**16, 33, 41**	6AM5, N77
EL91	B7G-25	**29**	see 6AM5
EL91/ 6AM5	B7G-25	**38**	EL91, 6AM5, N77
EL91/ N77	B7G-25	**30**	EL91, N77, 6AM5
EL95	B7G-67	**34, 35, 41**	
EL820	B9A-17	**43**	
EL821	B9A-19	**34**	
EL822	B9A-19	**34**	
ELL1	Ct8-19	**41**	
ELL80	B9A-68	**27,**	
EM1	Ct8-9	**89**	
EM3	Ct8-9	**89**	
EM4	Ct8-20	**89**	
EM34	IO-48	**89**	64ME
EM71	B8B-57	**88**	
EM80	B9A-41	**89**	6BR5, 65ME
EM80/ 6BR5	B9A-41	**89**	EM80, 6BR5, 65ME
EM81	B9A-41	**88, 89**	
EM84	B9A-56	**88, 89**	
EM85	B9A-40	**88**	
EM840	B9A-56	**88**	
EN30	IO-124	**96**	
EN31	IO-112	**96**	
EN32	IO-126	**96**	
EN70	B8D-10	**96**	

Valve	Base	Pages	Equivalents
EN91	B7G-51	96	
EN92	B7G-46	96	
EN93	B7G-72	96	
ESU76	Edison Screw	72	
ESU101	B4-6	72	
ESU103	UX4-9	72	
ESU866	UX4-9	72	
ESU866ES	Edison Screw	72	
EY51	Wires	86, 87	U43, 6X2, R12, R12A, SU61, U151
EY51/ 6X2	Wires	87	EY51, U43, 6X2, SU61, R12, R12A U151
EY51/ U43	Wires	87	EY51, R12A, U43, R12, SU61, U151, 6X2
EY70	B8D-11	74	
EY81	B9A-34	75	
EY83	B9A-34	102	
EY84	B9A-30	75	
EY86	B9A-50	86, 87, 88	
EY86/ 6S2	B9A-50	87	EY86, 6S2
EY91	B7G-50	72, 74	
EZ3	Ct8-14	75	
EZ4	Ct8-14	75	
EZ35	IO-54	73, 74, 75	6X5, U147, U70
EZ35/ U147	IO-54	74	EZ35, U147, 6X5, U70
EZ40	B8A-14	71, 72, 74	UU9, 66KU, U150
EZ40/ U150	B8A-20	74	EZ40, U150, 66KU, UU9
EZ41	B8A-14	74, 75	
EZ80	B9A-31	74	
EZ80/ 6V4	B9A-31	71, 72, 75	EZ80, 6V4
EZ81	B9A-31	71, 74, 75	U709
EZ81/ U709	B9A-31	73	EZ81, U709
EZ90	B7G-31	75	U78, 6X4
EZ90/ 6X4	B7G-31	72	6X4, EZ90, U78
EZ90/ U78	B7G-31	73	EZ90, U78, 6X4
F/7001	B7G-14	27	
FC2	B7-1	11	210PG, X22, VHT2A
FC2A	B7-1	11	210SPG, VO2
FC4	B7-2	12	15A2, 41MPG, MX40, VO4, VHT4
FC13	Ct8-2	12	
FC13C	B7-2	12	15D1, 13PGA, VO13, VHT4
FC31	—	81	
FC101	—	81	
FC107	—	81	
FC116	—	81	
FC117	—	81	
FC118	—	81	

Valve	Base	Pages	Equivalents
FC141	MO-5	8	
FT4	IO-46	89	
FW4-500	B4-5	74	451U, U18/20, RV200/600, 4/100BU, R43
FW4-800	B4-5	74	U18/20, RV200/600
FY	B5-6	31	PM24M, PP4
G1/236G	Wires	96	
G1/237	Wires	97	
G1/371K	B7G	97	
G/6C4	B7G-15	60	see 6C4
G/25L6	IO-36	26	see 25L6
G/50C5	B7G-42	26	see 50C5
G50/2G	Wires	92	
G55/1K	B7G-28	92	
G75/3G	B8B-58	92	
G120/1B	B4-12	92	
G150/2D	IO-141	97	
G180/2G	B8B-59	92	
G180/2M	B8B-59	92	
G240/2D	IO-141	97	
G300/1K	B7G-75	92	
G400/1K	B7G-62	92	
G400/2G	B7G-62	92	
GA31A	—	83	
GA41A	—	83	
GA51A	—	83	
GA52A	—	83	
GA53A	—	83	
GA61A	—	83	
GA62A	—	83	
GA63A	—	83	
GD3	—	46	
GD4	—	46	
GD5	—	46	
GD8	—	47	
GD9	—	47	
GD10	—	47	
GD11	—	47	
GD12	—	47	
GD14B	B5-9	95	
GDT4C	B5-9	95	
GET1	—	49	
GET2	—	49	
GET3	—	51	
GET4	—	51	
GET5	—	51	
GET15	—	51	
GET16	—	51	
GET20	—	51	
GET102	—	51	
GET103	—	51	
GET104	—	51	
GET105	—	51	
GET106	—	51	
GET110	—	51	
GET111	—	51	
GET113	—	51	
GET114	—	51	
GET115	—	51	
GET116	—	51	
GET120	—	51	
GET571	—	51	
GET572	—	51	
GET573	—	51	
GET691	—	51	
GET692	—	51	
GET871	—	51	
GET872	—	51	
GET873	—	51	

Valve	Base	Pages	Equivalents
GET874	—	51	
GET875	—	51	
GEX34	—	46	
GEX35	—	46	
GEX36	—	46	
GEX37	—	46	
GEX39	—	46	
GEX45/1	—	46	
GEX54	—	46	
GEX54/4	—	46	
GEX55/1	—	46	
GEX58	—	46	
GEX64	—	46	
GEX66	—	46	
GEX541	—	84	
GEX542	—	84	
GJ3M	—	81	
GJ4M	—	81	
GJ5M	—	81	
GJ6M	—	81	
GK3	B4-18	96	
GK10	B7G-56	96	
GK20	B7G-56	96	
GK32	Caps	96	
GK33	Wires	96	
GK40	Caps	96	
GK41	Wires	96	
GL1	IO-125	96	
GL2	IO-132	96	
GN10	IO-123	96	
GN20	IO-123	96	
GT1	—	49	
GT1C	B5-1	96	
GT2	—	49	
GT3	—	49	
GT3	IO-115	96	
GT11	—	49	
GT12	—	49	
GT13	—	49	
GT40	—	49	
GT41	—	49	
GT42	—	49	
GT43	—	49	
GT44	—	49	
GT45	—	49	
GT46	—	49	
GT47	—	49	
GU1	B4-4	73	
GU5	B4-6	73	
GU12	UX4-8	73	
GU50	B4-6	73	RG1/240
GXU1	UX4-8	73	
GXU2	B4F-1	73	4B32
GXU5	Special	73	
GXU50	B4-5	73	
GXU52	B8B—	73	
GZ30	IO-62	74	5Z4
GZ32	IO-62	72, 75	5V4
GZ33	IO-62	75	5U4, U54
GZ34	IO-62	75	
GZ37	IO-62	75	
H2D	B5-5	62	
H4D	B7-7	62	11A2, DDT, MHD4, ACHLDD, DDT4
H30	B7-23	63, 64	DS
H42	B7-23	63, 64	
H63	IO-18	63, 64	
H141D	MO-6	61	
HABC80	B9A-2	60	19T8
HAD	B7-7	62	11D3, 13DHA

Valve	Base	Pages	Equivalents
HBC90	B7G-19	65	
HBC91	B7G-19	66	
HD14	IO-91	63, 64	1H5, DAC32
HD22	B5-5	62, 64	210DDT, HD24, TDD2A, DDT2, H2D
HD23	B5-5	62, 64	210DDT, HD24, TDD2A, DDT2, H2D
HD24	B5-5	63, 64	210DDT, TDD2A, DDT2, H2D
HF93	B7G-16	23	12BA6
HK90	B7G-29	13	12BE6
HL2	B4-1	61, 62, 63, 64, 66	PM2HL, 210HL
HL4+	B5-1	66	
HL4g	B7-6	66	MH4
HL13	B7-23	64, 66	
HL13	Ct8-3	65	
HL13C	B7-23	65	
HL13S	Ct8-6	66	
HL21DD	B5-5	61	H2D
HL22	MO-2	61	
HL22D	MO-7	61	
HL23	MO-2	61	
HL23DD	MO-7	61	
HL41	MO-16	61	
HL41DD	MO-10	61	
HL42DD	MO-10	61	
HL92	B7G-42	34	50C5
HL133	MO-19	61	
HL133DD	MO-10	61	
HL1320	B7-23	61	UD1, DA, HL13C, HL13
HLDD1320	B7-7	61	202DDT, HAD, DDT13, 11D3
HN309	B9A-27	30, 32	
HP2	B7-11	62	
HP13	B7-6	23	
HP13S	Ct8-15	23	
HP210	B4-2	23	
HP210	B7-4	23	SPT2
HP211	B4-2	23	
HP211	B7-4	23	
HP215	B4-2	20	Z21, PM12, SP210, HP210
HP215	B7-4	20	SPT2, 210SPT, HP210
HP2018	B5-2	24	
HP2118	B5-2	24	
HP2118	B7-5	24	
HP4101	B5-2	23	
HP4101	B7-5	23	
HP4106	B5-2	23	
HP4106	B7-5	23	
HP4115	B5-2	23	
HP4115	B7-5	23	VPT4B
HR1	B7G-1	87	R10
HR2	B4-1	66	HR210
HR2	B7G-22	87	2T/270K
HR2S	Ct8-18	66	
HR3	B7G-22	87	
HR6	IO-22	72	
HR8	IO-103	87	SU42

Valve	Base	Pages	Equivalents
HR9	IO-131	87	
HR11	IO-120	87	
HR12	UX4-18	87	
HR210	B4-1	66	HR2
HT43	—	81	
HT44	—	81	
HT45	—	81	
HT46	—	81	
HT47	—	81	
HT48	—	81	
HT49	—	81	
HT50	—	81	
HT51	—	81	
HT52	—	81	
HT53	—	81	
HT54	—	81	
HT57	—	81	
HT59	—	81	
HT60	—	81	
HT61	—	81	
HT62	—	81	
HT63	—	81	
HTS5A	—	83	
HTS10A	—	83	
HVR1	B4-6	87	SU2150, U16
HVR2	B4-17	87	
HVR2A	B4-6	87	SU2150A, VLS61
HY90	B7G-33	71, 75	35W4
IW4-350	B4-14	74	R3, 431U, MU14, UU5, R42
IW4-500	B4-14	74	
K3/15	—	77	
K3/25	—	77	
K3/40	—	77	
K3/45	—	77	
K3/50	—	77	
K3/100	—	77	
K3/200	—	79	
K8/80	—	87	
K8/100	—	87	
K8/120	—	87	
K8/140	—	87	
K8/180	—	87	
K8/200	—	79, 87	
KB4	—	77	
KB5	—	77	
KBC32	IO-88	65	
KCF30	IO-98	11	
KD21	IO-74	91	OA3, VR75
KD24	IO-74	91	OC3, VR105
KD25	IO-74	91	OD3, VR150
KD60	Caps	91	
KD61	Wires	91	
KD63	Wires	91	
KF1	—	48	
KF2	—	48	
KF4	—	48	
KF6	—	48	
KF35	IO-85	21	
KG1	—	48	
KG2	—	48	
KG6	—	48	
KH1	—	48	
KH2	—	48	
KH4	—	48	
KH6	—	48	
KK32	IO-76	11	see FC2A
KL35	IO-78	32	
KLL32	IO-97	40	
KS30A	—	93	

Valve	Base	Pages	Equivalents
KS30B	—	93	
KS31A	—	93	
KS32A	—	93	
KS32B	—	93	
KS33A	—	93	
KS34A	—	93	
KS34B	—	93	
KS35A	—	93	
KS36A	—	93	
KS36B	—	93	
KS37A	—	93	
KS38A	—	93	
KS38B	—	93	
KS39A	—	93	
KS40A	—	93	
KS40B	—	93	
KS41A	—	93	
KS42A	—	93	
KS42B	—	93	
KS43A	—	93	
KS44A	—	93	
KS44B	—	93	
KT2	B5-6	30, 31	Pen B1, 220/OT, Pen 220, PM22A, PP2, 210HPP, 220HPT, PT2
KT8	B5-2	69	
KT21	B5-6	29, 31	KT24, Pen 231, PM22D
KT24	B5-6	29, 31	Pen 231, PM22A, PT2
KT30	B7-24	30, 31	7D5, PTA, N30, PP13A
KT31	B7-15	30, 31	PT6A, N31, PTS
KT32	IO-36	30, 32, 39, 40	25L6
KT33C	IO-73	30, 32, 39, 40	
KT35	IO-73	30, 31, 39	
KT36	IO-38	43	
KT41	B7-24	30, 31	7A3, 420T, AC/2Pen, APP4B, PT4, Pen A4, Pen 4VB, 42MPPen
KT42	B7-24	30, 31	7A2, MPPen, MKT4, ACPen, P4VA, APP4A
KT44/45	B7-37	32, 43	
KT45	B7-37	30, 31, 43	
KT55	—	39, 40	
KT61	IO-36	30, 32, 39, 40	
KT63,	IO-36	30, 32, 39, 40	6F6
KT66	IO-36	30, 32, 39, 40	EL37, PP60
KT71	IO-36	30, 32, 39, 40	50L6
KT76	IO-36	30, 32, 39, 40	
KT77	—	39	
KT81	B8B-10	30, 31, 39	
KT88	IO-36	30, 39	

Valve	Base	Pages	Equivalents
KT101	B8B-10	**30, 32, 40**	
KTW61	IO-8	**19, 21**	
KTW63	IO-9	**19, 21**	6K7, 6U7
KTZ41	B7-30	**19, 21**	
KTZ63	IO-8	**19, 21**	6J7, 6S7
L2	B4-1	**61, 62**	
L4	B5-1	**29**	
L12	Sm4-1	**30**	
L21	B4-1	**62, 64**	HL2
L21DD	B5-5	**61**	210DDT, H2D, HD24, HL21DD, TDD2A, DDT2B,
L22DD	MO-7	**61**	
L30	B7-16	**63, 64**	
L63	IO-20	**63, 64**	6J5, 6C5
L77	B7G-15	**63, 64**	6C4, EC90
L210	B4-1	**63**	HL2
LD210	B4-1	**66**	
LL2	B4-1	**66**	HL2
LL25	Ct8-18	**66**	
LN119	B9A-37	**30**	see UCL82
LN152	B9A-13	**32, 64**	see ECL80
LN309	B9A-27	**30, 32, 39, 40, 63, 64**	
LN319	B9A-27	**30, 63**	
LP2	B4-1	**29, 30, 31**	P2, PX230
LP4	B4-1	**29, 38**	4XP, PX4, PP3/250, ACO44, P12/250
LP220	B4-1	**34**	L2
LW7	—	**81**	
LW9	—	**81**	
LW13	—	**81**	
LW15	—	**81**	
LZ319	B9A-25	**11**	see PCF80/LZ319
LZ329	B9A-25	**10**	
M1	—	**46**	
M3	—	**46**	
M5R-321	B12A-7	**101**	
M6S-303	B12A-7	**101**	
M6S-312	B12A-5	**101**	
M60-302	B12A-7	**101**	
M8079	B7G-18	**45**	see EB91
M8081	B7G-17	**66, 70**	see ECC91
M8082	B7G-25	**33**	see EL91
M8083	B7G-21	**22**	see EF91
M8096	B9A-11	**69**	see QV03-12
M8097	B7G-23	**65**	see EAC91
M8098	B7G-28	**92**	see 85A2
M8099	B7G-24	**65**	see EC91
M8100	B7G-14	**22**	see EF95
M8101	B7G-16	**22**	see EF93
M8136	B9A-1	**65**	see ECC82
M8137	B9A-1	**65**	see ECC83
M8142	B7G-28	**92**	see 85A2
M8157	B96-6	**69**	see QVO4-7
M8161	B7G-21	**22**	see EF92
M8162	B9A-1	**65**	see ECC81
M8163	B7G-55	**92**	see 150B2
M8178	B8D-16	**65**	see EC71
M8190	B7G-28	**92**	`85A3
M8206	B7G-28	**92**	see 90C1
M8208	B7G-55	**92**	see 150B2
M8212	B7G-18	**45**	see 6AL5
M8223	B7G-28	**92**	see 150C4
M8224	B7G-28	**92**	see 108C1
M8225	B7G-55	**92**	see 75C1
MA393	—	**57**	
MAS20	—	**57**	
ME6-S	Ct8-9	**89**	
ME41	MO-21	**88**	
ME91	MO-21	**88**	
ME920	B7-19	**88**	
MH4	B5-1	**63**	41MTL, D4, ACHL, 354V, HL4
MH4Met	B5-1	**64**	
MH40	B5-1	**63, 64**	
MH41	B5-1	**64**	HLA2, 41MTL, AC2HL, 904V
MH206	B7-1	**13**	
MH4105	B7-2	**13**	15A2, 41MPG, MX40, VHT4
MHD4	B7-7	**63**	11A2, DDT, H4D, ACHLDD, DDT4, ACDDT, TDD4
MHD4-Met	B7-7	**64**	
MHL4	B5-1	**63**	154V, 164V
MHL4-Met	B5-1	**64**	
MKT4	B7-24	**30, 31**	7A2, MP Pen, AC Pen, Pen 4VA, APP4A
ML4	B5-1	**63, 64**	L4
MO465	B7-2	**13**	
MP Pen	B7-24	**27**	7A2, MKT4/7, AC Pen, Pen 4VA, APP4A
MR4A	—	**77**	
MS1H	—	**81**	
MS2H	—	**81**	
MS3H	—	**81**	
MS4	B5-2	**19, 20**	MS Pen, MS4B, ACSG, SP4, AS4120
MS4B	B5-2	**19, 21**	SGA1, MS Pen, ACSG, SP4, AS4120, AC/SH, AC/52, MSG/HA, MSG/LA, SV4, SV4A, SV4B, SPT4VA
MS4H	—	**81**	
MS5H	—	**81**	
MSGHA	B5-2	**16**	SGA1, AS4120, MS Pen, 8A1, MS4B, ACSG, SPT4A, SP4
MSGLA	B5-2	**16**	MS Pen, MS4B, ACSG, SP4, AS4120, 8A1, MSP4, ACS2, HP4101C, SPT4A
MS/Pen	B7-5	**16**	8A1, SPT4A, MSP4, ACS2Pen, SP4
MS/PenA	B5-2	**16**	MS Pen, 8A1, MSP4, ACS2Pen, HP4101C, SPT4A
MS/PenB	B7-6	**16**	SP4B
MSP4	B5-2	**19, 21**	
MSP4	B7-5	**19, 21**	
MSP41	B5-2	**19, 21**	
MSP41	B7-5	**19, 21**	
MU2	B4-6	**86**	
MU12	B4-5	**73**	R3, 431U, MU14, UU5, IW4/500, R2, R42
MU14	B4-5	**73, 74**	RB, 431U, UU5, 1W3, IW4/500, APV4, R2, IW4/350, UU3, UU4, UU120/350, 1861, 1867, UU120/500
MVS/Pen	B7-6	**16**	W42, AC/VP2, VP4B
MVS/ Pen B	B7-6	**16**	W42, AC/VP2, VP4B
MVSG	B5-2	**16**	MVS Pen, VMS4B, ACSGVM, S4VB, AS4125
MW6-2	Special	**101**	
MW22-7	B8B-53	**101**	
MW22-14	B8B-53	**101**	
MW22-14C	B8B-53	**101**	
MW22-16	B12A-1	**101**	
MW22-17	B12A-1	**101**	
MW22-18	B12A-1	**101**	
MW31-7	B8B-53	**101**	
MW31-14	B8B-53	**101**	
MW31-14C	B8B-53	**101**	
MW31-16	B12A-1	**101**	C12FM, 121K, 12XP4
MW31-17	B12A-1	**101**	
MW31-18	B12A-1	**101**	
MW31-20	B8B-53	**101**	
MW31-21	B8B-53	**101**	
MW31-22	B12A-1	**101**	
MW31-23	B12A-1	**101**	
MW31-74	B12A-1	**98, 100, 101**	C12/1
MW36-22	B12A-1	**101**	
MW36-24	B12A-1	**100, 101**	C36-24, 141K TR14/21
MW36-44	B12A-10	**101**	

Valve	Base	Pages	Equivalents
MW41-1	B12A-1	**101**	
MW43-43	B12A-10	**101**	
MW43-64	B12A-10	**100**	171K, 17AXP4, 172K, TR17/21, C17/1
MW43-69	B12A-10	**98, 101**	TR17/22, C17/1A
MW43-80	B12A-10	**101**	C17/4A
MW53-20	B12A-10	**101**	
MW53-80	B12A-10	**98, 101**	C21/1A, TR21/22
MX40	B7-2	**10, 11**	15A2, 41MPG, VHT4, MH4105, FC4, VO4
MZ05-20	B4-1	**69**	
N14	IO-78	**30, 31, 39**	1C5, DL35
N15	IO-87	**29, 31, 39**	
N16	IO-87	**30, 31**	3Q5, DL33
N17	B7G-6	**29**	3S4, 1P10, DL92
N17	B7G-6	**31**	see DL92
N18/3Q4	B7G-6	**30, 32**	N18, 3Q4
N19	B7G-58	**30, 32**	see DL94
N25	B7G-9	**30**	see DL96
N37	B7G-25	**32**	
N43	B7-15	**30, 31**	
N77	B7G-25	**30**	see EL91
N78	B7G-25	**30, 39, 40**	6BJ5
N108	B7G-25	**30, 32**	
N118	B8A-7	**30**	
N119	B9A-16	**30**	see UL84
N142	B8A-23	**40**	see UL41
N144	B7G-63	**32**	EL91, N77, 6AM5
N145	B8A-7	**32**	10P13
N147	IO-36	**32**	see EL33
N148/ 7C5	B8B-10	**32**	N148, 7C5
N150	B8A-23	**32**	see EL41
N151	B8A-23	**32**	see EL42
N152	B9A-17	**43**	see PL81
N155	B9A-26	**32**	
N308	IO-129	**30, 43**	
N309	B9A-14	**30, 32**	see PL83
N329	B9A-16	**30, 32, 39, 40**	see PL82
N339	B9A-17	**43**	PL81, 21A6, N152
N359	B9A-17	**43**	see PL81
N369	B9A-16	**30**	
N379	B9A-16	**30**	see PL84
N388/6 to N388/200	—	**79**	
N709	B9A-16	**30, 32, 39, 40**	see EL84
N727	B7G-27	**30, 39**	see EL90
N727/ 6AQ5	B7G-27	**32, 40**	N727, 6AQ5, EL90
O11L992	—	**81**	
O11L999	—	**79**	
O15/400	B4-1	**34**	
OA2	B7G-28	**90, 91, 92**	
OA2WA	B7G-28	**91**	
OA3	IO-74	**91, 92**	VR75/30, KD21
OA5	—	**84**	
OA7	—	**47**	
OA10	—	**47**	
OA60	—	**47**	
OA61	—	**47**	
OA70	—	**47**	
OA71	—	**47**	
OA73	—	**47**	
OA79	—	**47**	
OA81	—	**47**	
OA85	—	**47**	
OA86	—	**47**	
OA90	—	**47**	
OA91	—	**47**	
OA95	—	**47**	
OA200	—	**84**	
OA202	—	**84**	
OA210	—	**84**	
OA211	—	**84**	
OAZ200	—	**94**	
OAZ201	—	**94**	
OAZ202	—	**94**	
OAZ203	—	**94**	
OAZ204	—	**94**	
OAZ205	—	**94**	
OAZ206	—	**94**	
OAZ207	—	**94**	
OAZ208	—	**94**	
OAZ209	—	**94**	
OAZ210	—	**94**	
OAZ211	—	**94**	
OAZ212	—	**94**	
OAZ213	—	**94**	
OB2	B7G-28	**90, 91, 92**	
OB2WA	B7G-28	**91**	
OB3	IO-74	**92**	
OC2	B7G-28	**90, 91, 92**	
OC3	IO-74	**91, 92**	
OC16	—	**51**	
OC19	—	**52**	
OC22	—	**52**	
OC23	—	**52**	
OC24	—	**52**	
OC26	—	**52**	
OC28	—	**52**	
OC29	—	**52**	
OC35	—	**52**	
OC36	—	**52**	
OC41	—	**52**	
OC42	—	**52**	
OC44	—	**52**	
OC45	—	**52**	
OC50	—	**49**	
OC51	—	**49**	
OC57	—	**52**	
OC58	—	**52**	
OC59	—	**52**	
OC60	—	**52**	
OC65	—	**52**	
OC66	—	**52**	
OC70	—	**52**	
OC71	—	**52**	
OC72	—	**52**	
OC73	—	**52**	
OC75	—	**52**	
OC77	—	**52**	
OC83	—	**52**	
OC84	—	**52**	
OC122	—	**52**	
OC123	—	**52**	
OC139	—	**52**	
OC140	—	**52**	
OC170	—	**52**	
OC171	—	**52**	
OC200	—	**53**	
OC201	—	**53**	
OC202	—	**53**	
OC203	—	**53**	
OC204	—	**53**	
OC205	—	**53**	
OC206	—	**53**	
OD3	IO-74	**91, 92**	
OM1	IO-55	**71**	CY31, U281
OM4	IO-29	**60**	EBC33
OM5B	IO-8	**17**	EF37A
OM5C	IO-8	**17**	
OM6	IO-8	**17**	W147, EF39
OM10	IO-3	**8**	
OY4	IO-61	**76**	
OZ4	IO-57	**71, 72, 76**	
P2	B4-1	**30, 31**	PX230, LP2
P12/250	B4-1	**34**	PX4, PP3/250, 4XP, LP4, ACO44
P15/250	B4-1	**34**	
P27/500	B4-1	**34**	PX25, LP25
P41	MO-16	**61**	
P46H1X to P46H9X	—	**77**	
P61	MO-16	**61**	
P215	B4-1	**28, 31, 34**	L2
P220	B4-1	**28, 31**	L2
P220A	B4-1	**28**	LP2
P2018	B5-1	**34**	
PA1	B5-1	**26**	ACP1, O54V, 41MXP, LL4
PA20	B4-1	**28**	2P, ACO42
PA40	B4-1	**38**	DA30, DO30, P30/500
PABC80	B9A-2	**66**	
PC95	B7G-79	**65**	
PCC84	B9A-28	**66**	7AN7, 30L1, B319
PCC84/ 7AN7	B9A-28	**60, 61, 62**	PCC84, 7AN7, B319, 30L1
PCC84/ B319	B9A-28	**63, 64**	PCC84, B319, 30L1, 7AN7
PCC85	B9A-39	**61, 66**	9AQ8
PCC85/ 9AQ8	B9A-39	**62**	PCC85, 9AQ8
PCC88	B9A-39	**66, 67**	
PCC89	B9A-28	**61, 66**	
PCF80	B9A-25	**12, 15, 60**	LZ319,30C1, 8A8, 9A8
PCF80/ 9A8	B9A-25	**8**	LZ319, 30C1, PCF80, 8A8, 9A8
PCF80/ LZ319	B9A-25	**11**	LZ319, PCF80, 8A8, 30C1, 9A8
PCF82	B9A-25	**8, 10, 12**	9U8
PCF82/ 9U8	B9A-25	**7**	PCF82, 9U8
PCF84	B9A-65	**13**	
PCF86	B9A-64	**7, 12**	7HG8
PCL82	B9A-37	**27, 34, 37, 38, 41, 60, 61, 64, 66**	16A8

Valve	Base	Pages	Equivalents
PCL82/ 16A8	B9A-37	**29**	PCL82, 16A8
PCL83	B9A-27	**27, 29, 35, 39, 41, 61, 66**	LN309
PCL83/ LN309	B9A-27	**30, 32, 39,** 40, **63,** 64	PCL83, LN309
PCL84	B9A-53	**16,** 27, **29,** 30, 34, **60,** 61, 66	
PCL85	B9A-66	**27,** 34, **60,** 61, 66	
PD220	B7-10	**38**	HP2
PD220A	B7-10	**38**	
Pen 4DD	B7-22	**33**	DDPP4M
Pen 4VA	B5-7	**32**	7A2, MKT4/5, APP4A
Pen 4VA	B7-24	**32**	7A2, MP Pen, MKT4/7, AC Pen, APP4A
Pen 24	MO-3	**28**	Pen 25
Pen 25	MO-3	**28**	Pen 24
Pen 26	Ct8-4	**33**	
Pen 36C	B7-24	**33**	7D6, Pen 3520, PP35
Pen40DD	B7-22	**33**	Pen DD4020, DDPP39M
Pen 44	MO-20	**28, 38**	
Pen 45	MO-20	**28, 38**	
Pen45AN	MO-20	**28**	see Pen 45
Pen45DD	MO-15	**28**	
Pen 46	MO-14	**42**	
Pen 141	MO-3	**28**	
Pen 220	B5-6	**28**	KT2, PT2
Pen 220A	B5-6	**28**	
Pen 231	B5-6	**28**	
Pen 383	MO-20	**28**	
Pen 384	MO-20	**28**	
Pen 428	B7-24	**32, 40**	
Pen453DD	MO-15	**28**	
Pen 1340	B7-24	**28**	7D8, PTA
Pen 3520	B7-24	**28**	7D6
Pen 3820	B7-24	**28**	
Pen A1	B5-6	**26**	PT41, PM24M, PT4, PP4
Pen A4	B7-24	**33**	7A2, APP4B, 420T, PT4, KT41, AC2 Pen
Pen B4	B7-24	**33**	AC4 Pen, APP4E
Pen DD-1360	B7-9	**28**	
Pen DD-4020	B7-9	**28**	
Pen DD-4021	B7-9	**28**	
PL33	IO-36	**33, 35, 41**	
PL36	IO-129	**42, 43**	25E5
PL38	IO-40	**42, 43**	
PL81	B9A-17	**43**	21A6, N152, N359
PL81/ 21A6	B9A-17	**39, 42**	PL81, 21A6, N152, N359
PL81/ N152	B9A-17	**43**	PL81, N152, 21A6, N359
PL81/ N359	B9A-17	**43**	PL81, 21A6, N152, N359
PL82	B9A-16	**33, 41**	N329, N154, 16A5
PL82/ 16A5	B9A-16	**27, 39**	N329, N154, PL82, 16A5
PL82/ N329	B9A-16	**30, 32, 39, 40**	N329, PL82, N154, 16A5
PL83	B9A-14	**27, 34**	N309, N153
PL83/ N309	B9A-14	**30, 32**	PL83, N309, N153
PL84	B9A-16	**27, 29, 34, 39**	N379
PL84/ N379	B9A-16	**30**	N379, PL84
PL820	B9A-17	**43**	
PM1HF	B4-1	**65**	210HF
PM1LF	B4-1	**65**	210LF
PM2	B4-1	**32**	
PM2A	B4-1	**32**	220PA, L2
PM2B	B7-10	**40**	220B, B21, PD220
PM2HL	B4-1	**65**	HL2
PM12M	B4-2	**21**	W21/4, VS2
PM22	B5-6	**32**	
PM22A/5	B5-6	**32**	KT2, PT2, 220/OT
PM22D	B5-6	**32**	
PM24A	B5-6	**32**	
PM24M	B5-6	**32**	Pen A1,PT41, PM4, PP4
PM202	B4-1	**32**	LP2
PP2	B5-6	**34**	PT2
PP2	B4-7	**34**	
PP3/250	B4-1	**28**	4XP, LP4, ACO44, PX4
PP4	B5-6	**34**	
PP5/400	B4-1	**28**	PX25, DP24, P27/500, LP25
PP24	B7-15	**34**	
PP24S	Ct8-4	**34**	
PP34	B7-15	**34**	
PP34S	Ct8-4	**34**	
PP35	B7-24	**34**	
PP36	B7-25	**34**	
PP37	B7-15	**34**	
PP60	IO-36	**35, 41**	EL37, KT66
PP215	B5-6	**34**	
PP222	B4-7	**34**	
PP222	B5-7	**34**	KT2
PP225	B5-6	**34**	
PP2018	B5-7	**34**	
PP3521	B7-16	**28**	
PR1	—	**77**	
PT2	B5-6	**29**	KT2
PT4	B7-24	**29**	Pen A1,PT41, AC/2 Pen, PM24M, PP4, 7A3
PT4D	B7-9	**29**	420TDD, DN41, AC/2PenDD, DDPP4B
PT10	B7-24	**27**	AC/5Pen
PT15	B5-14	**69**	
PT25	B5-6	**30, 31**	Pen 24D, PP4
PT41	B5-6	**27**	Pen A1, PT4, PM24M
PT41B	B5-6	**27**	Pen 24D, PP4
PTA	B7-24	**29**	
PTSD	B7-9	**29**	
PTZ	B7-15	**29**	
PV1-35	B7-39	**69**	
PV25	B7-29	**75**	
PV29	B7-29	**75**	
PV30	B7-29	**75**	
PVB6	B5-3	**75**	
PV06-25	B7-39	**69**	
PX4	B4-1	**30, 32, 39, 40**	4XP, LP4, PP3/250, ACO44, PX41, P12/250, P460
PX5	B4-1	**31**	PX25, LP25
PX25	B4-1	**30, 32, 39, 40**	PP5/400, DO24, P27/500, PX5, LP25
PX230	B4-1	**31**	P2, LP2
PY31	IO-55	**74, 75, 102**	
PY32	IO-111	**71, 73, 74, 75, 76**	
PY80	B9A-18	**102**	
PY80/ 19X3	B9A-18	**102**	PY80, 19X3, U309, U152
PY80/ U309	B9A-18	**73, 102**	PY81, U309, U152, 19X3
PY81	B9A-34	**73, 102**	17Z3, U153, U329, U251
PY81/ 17Z3	B9A-34	**102**	PY81, U251, 17Z3, U153 U329
PY82	B9A-18	**75**	19Y3, U319, U154
PY82/ 19Y3	B9A-18	**71, 73**	19Y3, U319, PY82, U154
PY82/ U319	B9A-18	**73, 74**	PY82, U319, 19Y3, U154
PY83	B9A-34	**102**	
PY88	B9A-34	**102**	
PZ30	IO-52	**72, 74, 76,102**	R14
Q1/1	—	**77**	
Q1/2	—	**77**	
Q1/5	—	**77**	
Q3/1 to K3/200	—	**79**	
Q3/3	—	**77**	
Q3/4	—	**77**	
Q3/5	—	**77**	
Q6/1	—	**77**	
Q6/5	—	**77**	
Q8/1 to K8/200	—	**79**	
QA2402	B7G-25	**30**	see EL91
QP21	B7-11	**39, 40**	
QP22B	B7-11	**40**	240QP
QP25	MO-9	**38**	
QP230	B7-11	**38**	
QP240	B7-11	**39**	
QP240	B9-4	**38**	
QPT2	B7-11	**38**	
QQVO2-6	B9A-29	**70**	
QQV03-10	B9A-29	**70**	
QQV03-20A	B7A-1	**70**	
QQV04-20	IO-14	**69**	
QQV06-40A	B7A-1	**70**	
QQV07-40	B7A-1	**69**	
QQZ04-15	B8B-50	**69**	

Valve	Base	Pages	Equivalents
QS75/20	B7G-70	**91**	
QS75/40	IO-74	**91**	
QS75/60	B8B-64	**91**	
QS83/3	B7G-52	**91**	
QS92/10	B4-12	**91**	
QS95/10	B7G-40	**91**	
QS105	B8B-55	**91**	
QS108/45	B8B-55	**91**	
QS150/15	B7G-40	**91**	
QS150/40	IO-74	**91**	VR150/30, SV-VR150/30, OD3, KD25
QS150/45	B8B-55	**91**	
QS1200	B7G-55	**91**	
QS1201	B7G-28	**91**	
QS1202	B7G-28	**91**	
QS1203	B7G-28	**91**	
QS1205	IO-74	**91**	see OA3
QS1206	IO-74	**91**	see OC3
QS1207	B7G-28	**91**	see OA2
QS1208	B7G-28	**91**	see OB2
QS1209/ 5651	B7G-28	**91**	
QS1210	B7G-28	**91**	see OA2WA
QS1211	B7G-28	**91**	see OB2WA
QS1212	B7G-28	**91**	
QS1213	B7G-28	**91**	
QS1215	B7G-28	**91**	
QV03-12	B9A-11	**69**	5763
QV04-7	B9G-6	**69**	
QV05-25	UX5-6	**69**	807
QV06-20	IO-134	**70**	
R1	B4-14	**70**	431U, U10, UU5,DW2, PV495, R41, 442BU, 1W3, R42
R2	B4-14	**70**	R3, 431U, R4, MU14, UU5, IW4/500, APV4, 441U, 460BU, IW4/350, R43
R3	B4-14	**70**	431U, R4A, MU14, UU5, IW4/500, APV4, R2
R4	B4-5	**72**	431U, U14, DW4/350, RV120/350, R4A
R4A	B4-5	**72**	451U, U14, DW4/500, RV120/500, R3, UU5
R10	B7G-22	**86**	HR1, HR2
R11	B4-6	**86**	
R12	Wires	**86**	SU61, EY51, U43, 6W2
R13A	IO-54	**72**	
R14	IO-52	**71**	PZ30
R16/1T2	Wires	**86**	R16, 1T2
R17	B9A-30	**70**	
R18	B9A-30	**71**	EY84
R19/ 1X2B	B9A-32	**86**	R19, 1X2B
R20	B9A-50	**86**	
R42	B4-14	**72**	
R43	B4-5	**72**	
R52	IO-62	**72**	5Z4, GZ30, 52KU
R417A	B9A —	**63**	
R5559	B9A —	**63**	
RA	B5-8	**72**	
RG1-240A	B4-6	**75**	
RG3-250	Edison Screw	**74**	
RG3-250A	B4D-1	**74**	
RG3-1250	Edison Screw	**75**	
RG250/1000	B4-6	**75**	
RG250/3000	UX4-6	**75**	
RMO	—	**77, 79**	
RM1	—	**77, 79**	SM1
RM1A	—	**77**	SM1
RM2	—	**77, 79**	SM2/3
RM3	—	**77, 79**	SM2/3
RM4	—	**77, 79**	
RM4B	—	**77**	
RM5	—	**77**	SM5
RR0	—	**78**	
RR1	—	**78**	
RR2	—	**78**	
RR3	—	**78**	
RR3-250	B4D-1	**75**	
RS20A	—	**84**	RS20AF
RS20AF	—	**84**	
RS21A	—	**84**	RS21AF
RS21AF	—	**84**	
RS22A	—	**84**	RS22AF
RS22AF	—	**84**	
RS23A	—	**84**	RS23AF
RS23AF	—	**84**	
RS24A	—	**84**	RS24AF
RS24AF	—	**84**	
RS25A	—	**84**	RS25AF
RS25AF	—	**84**	
RS26AF	—	**84**	
RS27AF	—	**84**	
RS28AF	—	**84**	
RS30A	—	**84**	RS304
RS30BF	—	**84**	
RS31A	—	**84**	RS31BF
RS31BF	—	**84**	
RS32A	—	**84**	RS32BF
RS32BF	—	**84**	
RS33A	—	**84**	RS33BF
RS33BF	—	**85**	
RS34A	—	**84**	RS34BF
RS34BF	—	**85**	
RS35A	—	**84**	RS35BF
RS35BF	—	**85**	
RS36BF	—	**85**	
RS37BF	—	**85**	
RS38BF	—	**85**	
RS50AF	—	**85**	
RS51AF	—	**85**	
RS52AF	—	**85**	
RS53AF	—	**85**	
RS54AF	—	**85**	
RS55AF	—	**85**	
RV120/350	B4-5	**75**	U14, R4
RV120/500	B4-5	**75**	U14, R4
RV200/600	B4-5	**75**	U18/20, R43
RZ	B5-8	**72**	1D5
S2	B4-2	**18**	
S2P20	B9A-63	**69**	
S6F12	B7G-21	**18**	
S6F33	B7G-21	**18**	
S11E12	IO-138	**28**	
S12	Sm4-2	**20**	
S19G6	B7G-78	**86**	
S19G6F	B7G-78	**86**	
S23	B4-2	**20**	
S24	B4-2	**20**	
S130	B4-12	**90, 91**	
S130P	B4-15	**90, 91**	
S215A	B4-2	**17**	
S215B	B4-2	**17**	Z21
S215VM	B4-2	**17**	SG215, W214, **VS2**
S2018	B5-2	**23**	
S2018	B7-5	**23**	
SA495	—	**57**	
SA496	—	**57**	
SAA45	—	**57**	
SAC40	—	**57**	
SAC42	—	**57**	
SAC44	—	**57**	
SB2	—	**77**	
SB3	—	**77**	
SB128	—	**57**	
SB240	—	**57**	
SB344	—	**57**	
SB345	—	**57**	
SD	B5-8	**44**	
SD6	B7G-39	**44**	
SD61	B3G-1	**44**	EA50, **6D1**
SE14/70	B12A-11	**99**	
SE17/70	B12A-11	**99**	
SE211	B4-2	**23**	
SEI 4	—	**78**	
SEI 5	—	**78**	
SEI 7	—	**78**	
SEI 9	—	**78**	
SEI 10	—	**78**	
SEI 12	—	**78**	
SEI 60	—	**78**	
SEI 61	—	**78**	
SG215	B4-2	**17**	W214, **VS2**, S215VM
SJ051A	—	**82**	
SJ051B	—	**82**	
SJO52A	—	**82**	
SJ052B	—	**82**	
SJ101A	—	**82**	
SJ101B	—	**82**	
SJ102A	—	**82**	
SJ102B	—	**82**	
SJ201A	—	**82**	
SJ201B	—	**82**	
SJ202A	—	**82**	
SJ202B	—	**82**	
SJ301A	—	**82**	
SJ301B	—	**82**	
SJ302A	—	**82**	
SJ302B	—	**82**	
SJ401A	—	**82**	
SJ401B	—	**82**	
SJ402A	—	**82**	
SJ402B	—	**82**	
SJ501A	—	**82**	
SJ502B	—	**82**	
SJ601A	—	**82**	
SJ601B	—	**82**	
SM1	—	**79**	
SM2/3	—	**79**	
SM5	—	**79**	
SP2	B7-4	**21**	**Z21, 210SPT**
SP2B	B7-13	**23**	

Valve	Base	Pages	Equivalents
SP2BS	Ct8-25	23	
SP2D	B7-13	23	
SP4	B7-5	21	SPT4A, 8A1, MS Pen, MSP4, HP4101C
SP4	B7-6	23	SP4B
SP4B	B7-6	21, 23	MS Pen
SP4S	Ct8-15	23	
SP6	B7G-21	16	see EF91
SP13	B7-6	23	
SP13	Ct8-15	22	
SP13B	B7-6	23	
SP13C	B7-6	22	8D2, 13SPA, SP13B, SPTA
SP13S	Ct8-1	23	see SP13
SP22	MO-1	17	
SP41	MO-11	17	
SP42	MO-11	17	
SP61	MO-11	17	
SP141	MO-4	17	
SP181	MO-11	17	
SP210	B7-4	17	SP215, Z21, SPT2
SP215	B7-4	17	SP210, Z21, SPT2
SP220	B4-1	34	LP2
SP1320	B7-5	17	8D2, SP13C, SP13B, SPTA
SP2220	B7-5	17	
SPT2	B7-4	18	
SPT4A	B7-5	18	8A1
SPTA	B7-6	18	8D2
SR2201A	—	83	
SR2301A	—	83	
SR4201A	—	83	
SR4301A	—	83	
SR4401A	—	83	
SR4501A	—	83	
SS210	B4-2	23	
SS2018	B5-2	24	
ST11	B4-12	91	7475
STV280/40	B5-15	91	
STV280/80	B5-15	91	
SU25	IO-102	86	
SU42	IO-103	86	HR7, HR8
SU45	B7G-22	86	19G6
SU2150	B4-6	86	U21
SU2150A	B4-17	86	HVR2A
SVC1	—	47	
SVC2	—	47	
SVC3	—	47	
SX47	—	93	
SX51	—	93	
SX56	—	93	
SX62	—	93	
SX68	—	94	
SX75	—	94	
SX82	—	94	
SX631	—	84	
SX632	—	84	
SX633	—	84	
SX634	—	84	
SX641	—	84	
SX642	—	84	
SX643	—	84	
SX644	—	84	
SX645	—	84	
SX751	—	84	
SX752	—	84	
SX753	—	84	
SX754	—	84	
SX780	—	47	
SX781	—	47	
SX782	—	47	
SZT1	—	94	
SZT2	—	94	
T4D	B3G-1	45	D1
T9/2	IO-112	99	
T9/3	IO-112	100	
T9/5	IO-112	100	
T12/2	IO-112	99	
T12/3	IO-112	100	
T12/44	IO-112	100	
T12/46	IO-112	100	
T12/54	IO-112	100	
T12/56	IO-112	100	
T12/71U	IO-112	100	
T12/72U	IO-112	100	
T12/81U	IO-112	100	
T12/82U	IO-112	100	
T12/91	IO-112	100	
T12/92	IO-112	100	
T12/100	B12A-1	100	
T12/404	IO-112	100	
T12/449	IO-112	100	
T12/504	IO-112	100	
T12/549	IO-112	100	
T31	B5-9	95	
T41	MO-16	95	
T900	B12A-4	99	
T901A	B12A-4	99	
T908	B12A-1	99	
T909A	B12A-4	99	
T914	B12A-9	99	
T915	B12A-4	99	
TA10	B7B-1	99	
TA15	B7B-1	99	
TD03-5	Coaxial	70	
TD03-10	Coaxial	70	
TD03-10F	Coaxial	70	
TD04-20	Coaxial	70	
TD05-12	—	69	
TDD2A	B5-5	65	HD24
TDD4	B7-7	65	
TDD13C	B7-7	65	HAD, DDT13, 11D3
TH2	B7-34	12	220TH, X24
TH4A	B7-3	12, 13	20A1, 4THA, AC/TH1, TH4B
TH13C	B7-3	12	
TH21C	B7-3	12	302THA, 202STH, TH22C, TH2321, TX21, TH29, TH30C
TH22C	B7-3	12	302THA, 202STH, TH2321, TX21, TH29, TH30C
TH29	B7-3	13	
TH30C	B7-3	12	302THA, 202STH, TH2321, TX21, TH29, TH22C
TH41	MO-12	8	
TH232	B7-3	8	
TH233	MO-12	8	
TH2320	B7-3	8	
TK20	—	49	
TK21	—	49	
TK23	—	58	
TK24	—	49	
TK25	—	49	
TK28	—	58	
TK30	—	58	
TK31	—	58	
TK40	—	58	
TK41	—	58	
TK42	—	58	
TJ1	—	57	
TJ2	—	57	
TJ3	—	57	
TP1	—	49	
TP2	—	49	
TP22	B9-1	8	
TP23	B7-34	8	
TP25	MO-23	8	
TP26	MO-22	8	
TP1340	B9-2	8	
TP2620	B9-2	8	
TR14/1	IO-112	100	
TR14/2	IO-112	100	
TR14/4	IO-112	100	
TR14/8	B12A-1	100	
TR14/13	B12A-9	100	
TR14/15	B12A-9	100	
TR14/21	B12A-1	100	C36-24,141K, MW36-24
TR14/22	B12A-1	100	
TR17/1	IO-112	100	
TR17/2	IO-112	100	
TR17/8	B12A-9	100	
TR17/10	B12A-9	100	
TR17/21	B12A-1	100	C17/1, 171K, 17AXP4, MW43-64
TR17/22	B12A-1	100	C17/1A, MW43-69
TR21/21	B12A-1	100	
TR21/22	B12A-1	100	C21/1A, MW53/80
TS1	—	58	
TS2	—	58	
TS3	—	58	
TS4	—	49	
TS7	—	49	
TS8	—	49	
TS13	—	58	
TS14	—	58	
TS15	—	58	
TSP4	B7-6	21	ACSP3
TT4	B5-1	65	41MP, ML4, ACP, LL4, L4
TT4A	B5-1	65	
TT11	IO-113	69	
TT12	B9G-8	69	
TT15	B9G-5	69	44A/160M
TT20	B7A-1	69	
TT21	IO-129	39, 69	
TT22	IO-129	39, 69	
TV4	Ct8-9	89	
TX4	B7-3	13	X41
TX21	B7-3	13	
TY1-50	B4-16	69	4304CB
TY86F	—	87	
TZ05-20	B4-1	69	

Valve	Base	Pages	Equivalents
U10	B4-5	73, 74	431U, R1, UU5,DW2, PV495, 506BU, 1821, R41
U12	B4-5	73	R3, 431U, U14, R4, UU5, DW4/350, R2, RV120/500
U14	B4-5	73, 74	R3, 431U, UU5, DW4/500, RV120/500, DW3, DW4, RV120/350, 442BU, 460BU, 1561, R42
U16	B4-6	87	SU2150, HVR1
U17	B4-6	73, 87	
U18/20	B4-5	73, 74	451U, FW4/500, RV200/600, R43, FW4/800, 4/100BU
U19	B4-6	73	
U19/20	B4-6	73	
U21	B4-6	86	SU2150
U22	MO-17	86	
U24	IO-102	86	
U25	Wires	86	
U26	B9A-50	86	
U27	B4-6	87	
U30	B7-12	73, 74	
U31	IO-55	73, 74	
U33	B4-6	87	
U35	IO-120	87	
U37	Wires	87	R16
U41	IO-58	87	
U43	Wires	87	see EY51
U45	Wires	87	
U47	Wires	87	
U49	B9A-50	87	
U50	IO-60	73, 74	5Y3
U52	IO-60	73, 74	5U4
U60	IO-139	87	
U70	IO-54	74	6X5, EZ35, U147
U76	IO-55	73, 74	35Z4
U78	B7G-31	73	see EZ90
U78/6X4	B7G-31	74	EZ90, 6X4, U78
U81	B8B-24	73	
U82	B8B-1	74	7Z4, U149, 7Y4
U84	B8B-24	73	
U101	B8B-25	73, 74	
U107	B7G-13	73, 74	
U118	B8A-1	73	
U119	B9A-18	73	see UY85
U142	B8A-22	74	
U143	IO-60	74	see AZ31
U145	B8A-5	74	U404
U147	IO-54	74	see EZ35
U149/7Y4	B8B-1	74	U149, 7Y4, U82
U150	B8A-20	74	see EZ40
U151	Wires	87	R12, SU61, 6X2, EY51, U43
U152	B9A-18	102	PY80, U309
U153	B9A-34	102	U329, U251, PY81, 17Z3
U154	B9A-18	74	19Y3, PY83, U319,PY82
U191	IO-128	102	
U192	B9A-18	72	
U193	B9A-34	102	
U201	IO-55	72	CY31, OM1
U251	B9A-34	102	U153, U329, PY81, 17Z3
U281	IO-55	72, 102	CY31, OM1
U282	IO-121	102	
U291	IO-111	72	
U301	IO-128	102	
U309	B9A-18	73, 102	see PY80, 19X3,U152
U319	B9A-18	73, 74	see PY82
U329	B9A-34	102	U251, PY81, 17Z3, U153
U339	IO-128	102	
U381	B9A-18	72	
U403	MO-18	72, 102	
U404	B8A-1	72	U142, UY41
U709	B9A-31	73, 74	see EZ81
U718	B8A-14	73	
U801	IO-117	72, 102	
U4020	B5-8	72	1D5, 40SUA, RZ, URIC
UABC80	B9A-2	64, 66, 67	
UABC80/DH109	B9A-2	63	UABC80, DH109
UAF41	B8A-11	22	
UAF42	B8A-12	18, 22	WD142
UAF42/WD142	B8A-12	21	UAF42, WD142
UB41	B8A-10	45	
UBC41	B8A-9	59, 62, 65	10LD3, 14L7, 141DDT, DH142, DH118
UBC41/DH118	B8A-9	63	UBC41, DH118, DH142, 10LD3, 14L7
UBC41/DH142	B8A-9	64	UBC41, DH142, 10LD3, 14L7, 141DDT, DH118
UBC81	B9A-54	66, 67	DH119
UBC81/DH119	B9A-54	63	UBC81, DH119
UBF80	B9A-12	19, 22, 24	171DDP
UBF80/171DDP	B9A-12	17	UBF80, 171DDP
UBF89	B9A-12	17, 19, 23	WD119
UBF89/WD119	B9A-12	20	UBF89, WD119
UBL21	B8B-6	33	
UC92	B7G-65	65	
UCC84	B9A-28	61, 65, 67	
UCC85	B9A-39	61, 62, 64, 66, 67	
UCC85/B109	B9A-39	63	UCC85, B109
UCF80	B9A-25	12, 14	
UCH21	B8B-42	12	
UCH42	B8A-3	7, 12	141TH, X142
UCH42/141TH	B8A-3	8	141TH
UCH42/X142	B8A-3	11	141TH, UCH42, X142
UCH81	B9A-24	8, 9, 11, 13, 14	X119
UCH81/X119	B9A-24	10	
UCL82	B9A-37	27, 29, 35, 38, 61, 63, 66	
UCL82/LN119	B9A-37	30	UCL82, LN119
UCL83	B9A-27	29, 30, 33, 35, 61, 64, 65	
UD41	B7-33	71	
UF41	B8A-7	15, 17, 18, 22	W142, 121VP
UF41/W142	B8A-24	21	UF41, W142
UF42	B8A-8	22	Z142
UF42/Z142	B8A-8	21	UF42 Z142
UF80	B9A-10	23	
UF85	B9A-10	19, 22, 24	
UF86	B9A-23	23	
UF89	B9A-36	17, 19, 21, 23, 24	
UL41	B8A-23	26, 29, 30, 33, 37, 38, 40	N142, 451PT
UL41/451PT	B8A-23	27	UL41, 451PT, N142
UL41/N142	B8A-23	32, 40	UL41, N142, 451PT
UL44	B8A-16	43	
UL46	B8A-7	33, 35	
UL84	B9A-16	27, 29, 34, 35, 39, 41	
UL84/N119	B9A-16	30	UL84, N119
UM4	IO-136	89	
UM34	IO-48	89	
UM80	B9A-41	89	
UR1C	B5-8	74	1D5, 40SUA, RZ, U4020, V20
UR3C	B7-29	74	
UU4	B4-14	71	R3, 431U, MU14, 1W4/350, UU5, APV4, R2
UU5	B4-14	72	R3, 431U, R4H, MU14, 1W4/500, APV4
UU6	MO-8	72	
UU7	MO-8	72	
UU8	MO-8	72	
UU9	B8A-14	72	EZ40, 66KU, U150
UU10	B4-14	71	
UU12	B9A-31	72	
UU60/250	B4-5	73	R2, R42
UU120/350A	B4-5	73	R2, R42
UU120/500	B4-5	73	MU14, R43, R3
UY1N	IO-122	74	
UY21	B8B-4	74	
UY31	IO-55	74	
UY41	B8A-1	71, 72, 74	U142, 31A3, U404, 311SU

Valve	Base	Pages	Equivalents
UY41/ 311SU	B8A-15	71	311SU, U142, U404, 31A3, UY41
UY41/ U142	B8A-22	74	UY41, U142, 31A3, U404, 311SU
UY85	B9A-18	71, 73, 74, 75, 76	U119
UY85/ U119	B9A-18	73	UY85, U119
V3/1/1Y	—	77	
V3/2/1Y	—	77	
V6/2R	—	53	
V6/2RJ	—	53	
V6/4R	—	53	
V6/4RJ	—	53	
V6/8R	—	53	
V6/8RJ	—	53	
V10/1S	—	53	
V10/1SJ	—	53	
V10/2S	—	53	
V10/2SJ	—	53	
V10/15A	—	53	
V10/30A	—	53	
V10/50A	—	53	
V15/10DP	—	53	
V15/10P	—	53	
V15/20DP	—	53	
V15/20IP	—	53	
V15/20P	—	53	
V15/20R	—	53	
V15/30DP	—	53	
V15/30P	—	53	
V18-28-1RW	—	79	
V20	B5-8	76	UR1C
V25-28-1RW	—	79	
V25-40-1W	—	79	
V25-56-1RW	—	79	
V30	B5-1	75	
V30/10DP	—	53	
V30/10P	—	53	
V30/20DP	—	53	
V30/20IP	—	53	
V30/20P	—	53	
V30/30DP	—	53	
V30/30P	—	53	
V60/10P	—	54	
V60/20IP	—	53	
V60/20P	—	54	
V60/30P	—	54	
V312	B5-13	61	
V453	MO-11	17	
V503	B4-1	38	PX25A, P30/500, DA30
V914	B5-3	44	DD4, D41, 2D4A
V2118	B5-9	75	
VFT4	IO-46	89	
VFT6	IO-46	89	6M1, 6U5G, Y61
VHT2A	B7-1	9	
VHT4	B7-2	9	15A2
VHTA	B7-2	9	15D1
VHTS	B7-2	9	X30
VME4	B7-19	89	
VMP4G	B7-5	20	MVSPen, VP4A, VPT4B
VMS4	B5-2	19, 21	VP4, AS4125
VMS4B	B5-2	19, 20	MVSPen, AC/SGVM, VP4, AS4125
VO2	B7-1	13	X22
VO2S	Ct8-31	13	
VO4	B7-2	13	MX40, VHT4
VO13	B7-2	13	VHTA
VO13S	B7-2	13	
VP2	B7-4	21	W21/7, VPT2
VP2B	B7-13	23	
VP2B	B7-28	21	
VP2BS	Ct8-25	23	
VP2D	B7-13	23	
VP4	B5-2	21	9A1, MVSPen, VPT4, VMP4G, AC/VP1, HP4106
VP4	B7-6	21, 23	VMP4G, VPT4B
VP4A	B5-2	21	9A1, MVSPen
VP4A	B7-5	21	VMP4G, VPT4B
VP4B	B7-6	22, 24	MVSPen B, AC/VP2, W42
VP4S	Ct8-15	23	
VP13	B7-5	20	
VP13	B7-6	23	
VP13A	Ct8-15	22	
VP13B	B7-6	23	
VP13C	B7-6	22	9D2, 13VPA, VP1322, VP13B
VP13K	B7-6	24	
VP13S	Ct8-15	23	see VP13
VP21	B7-4	20	VPT2
VP22	MO-1	17	
VP23	MO-1	17	
VP41	MO-11	17	
VP133	MO-11	17	
VP210	B7-4	17	W21/7
VP215	B7-4	17, 20	W21/7
VP215B	B7-13	20	
VP215C	B7-4	20	
VP1320	B7-5	17	VPTA, VP13
VP1321	B7-5	17	202VP, VP13B
VP1322	B7-6	17	9D2, 13VPA, VP13C, VP13B
VPT2	B7-4	18	
VPT4	B5-2	18	9A1, MVSPen, VMP4G, AC/VP1, HP4106
VPT4B	B7-5	18	
VPTA	B7-5	18	
VPTS	B7-5	18	
VR7-A		93	
VR7-B	—	93	
VR8-A	—	93	
VR8-B	—	93	
VR9-A	—	93	
VR9-B	—	93	
VR10-A	—	93	
VR10-B	—	93	
VR11-A	—	93	
VR11-B	—	93	
VR12-A	—	93	
VR12-B	—	93	
VR35-A	—	93	
VR35-B	—	93	
VR75/30	IO-74	90, 92	SV-VR75/30, OA3, KD21
VR105/30	IO-74	90, 92	SV-VR105/30, OC3, KD24
VR150/30	IO-74	90, 92	SV-VR150/30, OD3, QS150/40, KD25
VR425-A	—	93	
VR425-B	—	93	
VR475A	—	93	
VR475-B	—	93	
VR525A-A	—	93	
VR525A-B	—	93	
VR525B-A	—	93	
VR525B-B	—	93	
VR575A-A	—	93	
VR575A-B	—	93	
VR575B-A	—	93	
VR575B-B	—	93	
VR625-A	—	93	
VR625-B	—	93	
VS2	B4-2	18	W21/4
VS24	B4-2	20	VS2
VX2	B7-28	13	
VX2S	Ct8-31	13	
VX4	B7-35	13	
VX4S	Ct8-11	13	
VX13	B7-35	13	
VX13S	Ct8-11	13	
W1	—	48	
W2	—	48	
W3	—	48	
W4	—	48	
W5	—	48	
W6	—	48	
W7	—	48	
W8	—	48	
W9	—	48	
W10	—	48	
W17	B7G-2	20	see DF91
W21	B4-2	19	VS210, VS215, S213, 220VS, 210VPT, PM12M, S215VM, VP2, VP210, VP215, VS2, VPT2
W21Met	B4-2	21	
W25	B7G-64	20	see DF96
W30	B7-5	19, 21	VPTS, W31
W31	B7-5	19, 21	VPTS, W30
W42	B7-6	19	
W42Met	B7-6	21	
W61	IO-8	19	
W61M	IO-8	21	
W76	IO-8	19, 21	12K7
W77	B7G-21	19	see EF92
W77/9D6	B7G-21	21	W77, 9D6, EF92, VP6
W81	B8B-3	19, 21	7H7

Valve	Base	Pages	Equivalents
W101	B8B-3	19, 21	
W107	B7G-22	19, 21	
W118	B8A-8	19	
W119	B9A-10	20	
W142	B8A-24	21	see UF41
W143	B8B-61	21	see EF22
W145	B8A-8	21	10F9
W147	IO-8	21	see EF39
W148/ 7H7	B8B-3	21	W148, W81, 7H7
W149/ 7B7	B8B-3	21	W149, 7B7, EF22
W150	B8A-18	21	see EF41
W719	B9A-10	19, 21	see EF85
W727	B7G-16	19	see EF93
W727/ 6BA6	B7G-16	21	W727, 6BA6, EF93
W729	B9A-10	20, 21	
W739	B7G-64	20	
WD119	B9A-12	20	see UBF89
WD142	B8A-12	21	see UAF42
WD709	B9A-12	19, 24	see EBF80
WG4A	—	48	
WG4B	—	48	
WG5A	—	48	
WG5B	—	48	
WG6A	—	48	
WG7B	—	48	
WG7C	—	48	
WG7D	—	48	
WX1	—	48	
WX2	—	48	
WX3	—	48	
WX4	—	48	
WX5	—	48	
WX7	—	48	
WX8	—	48	
WX10	—	48	
WX11	—	48	
WX12	—	48	
WX13	—	48	
WX14	—	48	
WX15	—	48	
X14	IO-76	10	1A7, DK32
X17	B7G-3	10, 11	see DK91/ X17
X18	B7G-54	10	1AC6, 1C2, DK92
		11	see DK99
X20	B7G-54	10	see DK92/ X20
		11	see DK92
X21	B7-1	10	210PG, X22, FC2A, VHT2A, VO2
X22	B7-1	10, 11	X21, 210PG, FC2, VHT2, VO2
X23	B7-34	10	X24, 220TH, TH2
X24	B7-3	10	220TH, X23, TH2
X25	B7G-54	10	see DK96/ X25
X30	B7-2	11	15D1, VHTS
X31	B7-3	11	20D2
X32	B7-2	11	see X30
X41	B7-3	10, 11	20A1, 41STH, AC/TH1, TH4, TX4, 41SPH
X42	B7-2	11	15A2, 41MPG, VHT4, MX40
X61M	IO-3	10, 11	6K8, X65
X63	IO-1	10, 11	6A8
X64	IO-2	11	
X65	IO-3	10, 11	6K8, X61M
X71M	IO-3	11	12K8
X76M	IO-3	10	12K8
X78	B7G-48	10, 11	
X79	B9A-21	10, 11	
X81	B8B-8	10	7S7
X101	B8B-8	10 ,11	
X109	B9A-21	10, 11	
X118	B8A-3	10	
X119	B9A-24	10	see UCH81
X142	—	11	see UCH42/ X142
X143	—	11	see ECH21/ X143
X145	B8A-3	11	10C1
X147	—	11	see ECH35/ X147
X148/7S7	B8B-8	11	
X150	—	11	see ECH42/ X150
X719	—	10	see ECH81/ X719
X727	B7G-29	10	see EK90
X727/ 6BE6	B7G-29	11	EK90, X727, 6BE6
XA101	—	50	2G301
XA102	—	50	2G302
XA111	—	50	2G301
XA112	—	50	2G302
XA121	—	50	
XA122	—	50	
XA123	—	50	
XA124	—	50	
XA125	—	50	
XA126	—	50	
XA131	—	50	2G401, 2N384
XA141	—	50	2G403, 2N643
XA142	—	50	2G403, 2N644
XA143	—	50	2G403, 2N645
XA151	—	50	2G301
XA152	—	50	2G302
XA161	—	50	2N1300, 2G403
XA162	—	50	2G403, 2N1301
XA701	—	50	2N585, 2N1302
XA702	—	50	2N1304, 2N1090
XA703	—	50	2N1091, 2N1306
XB1	B7G-57	90	
XB2	B7G-57	90	
XB102	—	50	2G303
XB103	—	50	2G303
XB104	—	50	2G303
XB112	—	50	2G303
XB113	—	50	2G303
XB121	—	50	2G398
XC13	Wires	96	
XC18	Wires	96	
XC23	Wires	96	
XC24	Wires	96	
XC101	—	50	
XC121	—	50	
XC131	—	50	
XC141	—	50	2N456, 2N301
XC142	—	50	2N457, 2N301/A
XC171	—	51	
XC703	2S017-19	—	
	2S711-2	—	
	2N1479	—	
XC713	XB24B	—	2N1483
XC723	—	—	2N1487
XD1.5V	Sm4-1	63	
XD2.0V	Sm4-1	63	
XD201	—	46	
XD202	—	46	
XFG1	Wires	96	
XFR1	B5A-2	20	
XFR2	B5A-2	20	
XFR3	B5A-4	64	
XFR5	B5A-2	20	
XFT2	—	51	
XFW10	B5A-1	20	
XFW20	B5A-2	20	
XFW30	B5A-1	20	
XFW40	B5A-1	20	
XFW50	B5A-1	20	
XFY10	B5A-1	31	
XFY11	B5A-1	30	
XFY12	B5A-1	30	
XFY14	B5A-1	31	
XFY15	B5A-1	31	
XFY21	B5A-1	31	
XFY23	B5A-1	31	
XFY31	B5A-1	31	
XFY32	B5A-1	31	
XFY33	B5A-1	31	
XFY41	B5A-1	31	
XFY43	B5A-1	31	
XFY51	B5A-1	31	
XFY53	B5A-1	31	
XFY54	B5A-1	31	
XG2	B8D-10	96	
XG3	—	96	
XH1.5V	Sm4-1	63	
XH2.0V	Sm4-1	63	
XHP1.5V	Sm5-3	30	
XLO1.5V	Sm4-1	63	
XLO2.0V	Sm4-1	64	
XL1.5V	Sm4-1	63	
XL2.0V	Sm4-1	63	
XP1.5V	Sm4-1	31	
XP2.0V	Sm4-1	31	
XR6	B8D-4	20	
XR7	B8D-5	20	
XR8	B8D-8	64	
XS101	—	49	
XSG1.5V	Sm4-2	20	
XSG2.0V	Sm4-2	20	
XU604	—	83	1S103
XVS2.0V	Sm4-2	20	
XW0.75A	B5A-1	20	
XW0.75B	B5A-1	20	
XW1.5V	Sm5-1	20	
XW2.0V	Sm5-2	20	
XY1.4A	B5A-1	31	
XY1.4B	B5A-1	31	
XY1.4C	B5A-1	31	
XY1.5V	Sm5-1	31	
XY2.0V	Sm5-1	31	
Y13	B7-24	31	
Y25	B8D-9	89	1M1, 1M3, DM70
Y61	IO-46	89	6M1, VFT6, 6U5G
Y62	IO-46	89	6U5G, VHT6, Y61, 6M1

Valve	Base	Pages	Equivalents
Y63	IO-46	89	6U5G, 63ME, VFT6
Y64	IO-46	89	
Y65	IO-46	89	
Y119	B9A-19	89	
Y220	B4-7	31	
Y220	B5-6	31	KT2, PT2
Y230	B5-6	31	
Z2A33F	—	94	
Z2A36F	—	94	
Z2A39F	—	94	
Z2A43F	—	94	
Z2A47F	—	94	
Z2A51F	—	94	
Z2A56F	—	94	
Z2A62F	—	94	
Z2A68F	—	94	
Z2A75F	—	94	
Z2A82F	—	94	
Z2A91F	—	94	
Z2A100F	—	94	
Z2A110F	—	94	
Z2A120F	—	94	
Z2A130F	—	94	
Z2A150F	—	94	
Z11B1X	—	78	
Z11H8X	—	77	
Z11H9X	—	78	
Z11H16X	—	77	
Z11H17X	—	78	
Z12B1X	—	78	
Z12H8X	—	78	
Z12H9X	—	78	
Z12H14XF	—	78	
Z12H16X	—	78	
Z12H17X	—	78	
Z13B1X	—	78	
Z13H8X	—	78	
Z13H9X	—	78	
Z13H16X	—	78	
Z13H17X	—	78	
Z14	IO-77	19, 20	DF33, SPT2, 1N5
Z21	B4-2	19	HP210/4, HP215, PM12, PM12A, SP2, SP210, SP215, SP215B, 215S, 220S
Z21B1X	—	78	
Z21H8X	—	78	
Z21H9X	—	78	
Z21H16X	—	78	
Z21H17X	—	78	

Valve	Base	Pages	Equivalents
Z21Met	B4-2	21	
Z22	B7-4	19	HP210/7, 210SPT
Z22B1X	—	78	
Z22H8X	—	78	
Z22H9X	—	78	
Z22H16X	—	78	
Z22H17X	—	78	
Z22Met	B7-4	20	
Z26	B7-24	31	
Z46H10X to Z46H440X	—	78	
Z48H10X to Z48H440X	—	78	
Z62	IO-8	19, 21	
Z63	IO-8	19, 21	6J7, KTZ63
Z66	IO-8	19, 21	
Z77	B7G-21	19, 21	see EF91
Z90	B9G-1	19	EF50, 63SPT
Z142	B8A-8	21	see UF42
Z145	B8A-17	21	10F1
Z150	B8A-8	21	see EF42
Z152	B9A-10	21	see EF80
Z220	B4-7	31	
Z220	B5-6	31	
Z300T/1267	IO-108	96	
Z309	B9A-22	19	
Z319	B9A-46	19	
Z319/6351	B9A-46	21	
Z329	B9A-10	19	
Z359	B9A-47	19	
Z700U	Wires	96	
Z700W	Wires	96	
Z701U	B8D—	96	
Z719	B9A-10	19, 21	Z152, EF80, 6BX6, 6BW7
Z729	B9A-23	19, 20, 21, 63, 64	see EF86
Z749	B9A-10	19	
Z759	B9A-48	19	
Z800U	B9A-58	96	
Z801U	B9A-57	96	
Z803U	B9A-51	96	
Z804U	B9A-59	96	
Z900T	B7G-71	96	
ZC12H-16XFE	—	78	
ZC12H-17XFE	—	78	
ZC12H-18X	—	79	
ZC13D-8XE	—	78	SEI 11
ZC13D-9XE	—	78	SEI 12
ZC13H-16XE	—	78	SEI 7
ZC13H-16XF	—	78	
ZC13H-17XE	—	79	SEI 9
ZC22D-9X	—	78	
ZD	B5-8	44	

Valve	Base	Pages	Equivalents
ZD17	B7G-5	19	1S5, 1FD9, DAF91
ZD25	B7G-5	20	see DAF96
ZE22H-16X	—	78	
ZE22H-18X	—	78	
ZR10	—	83	
ZR10T	—	83	
ZR10TR	—	83	
ZR11	—	83	
ZR11T	—	83	
ZR11TR	—	83	
ZR12	—	83	
ZR12T	—	83	
ZR12TR	—	83	
ZR13	—	83	
ZR13T	—	83	
ZR13TR	—	83	
ZR14	—	83	
ZR14T	—	83	
ZR14TR	—	83	
ZR15	—	83	
ZR15T	—	83	
ZR15TR	—	83	
ZR20	—	83	
ZR20R	—	83	
ZR21	—	83	
ZR21R	—	83	
ZR22	—	83	
ZR22R	—	83	
ZR23	—	83	
ZR23R	—	83	
ZR24	—	83	
ZR24R	—	83	
ZS7	—	46	
ZS8	—	46	
ZS10A	—	46	
ZS10B	—	46	
ZS20A	—	46	
ZS20B	—	46	
ZS21	—	46	
ZS22	—	46	
ZS24	—	83	
ZS25	—	83	
ZS30A	—	83	
ZS30B	—	83	
ZS31A	—	83	
ZS31B	—	83	
ZS32A	—	83	
ZS32B	—	83	
ZS33A	—	83	
ZS33B	—	83	
ZS34A	—	83	
ZS34B	—	83	
ZS40	—	46	
ZS41	—	46	
ZS42	—	46	
ZS50	—	84	
ZS51	—	84	
ZS52	—	84	
ZS53	—	84	
ZT20	—	51	
ZT21	—	51	
ZT22	—	51	
ZT23	—	51	
ZW2	—	46	

PLF200 D. Rent.

Power output amplifier

g_m 21 (@ 30mA. I_A)

B10B.